

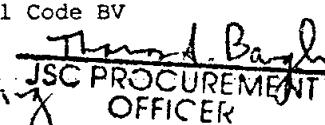
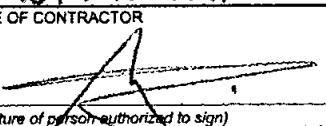
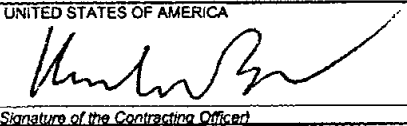
AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)		RATING DO-C9		PAGE OF PAGES 1 193	
2. CONTRACT (Proc. Inst. Ident.) NO. NNJ07GA17C				3. EFFECTIVE DATE 01/01/2008		4. REQUISITION/PURCHASE REQUEST/PROJECT NO. 4200231411	
5. ISSUED BY NASA/Johnson Space Center Attn: Suzan P. Moody, Mail Code BV 2101 NASA Parkway Houston TX 77058-3696		CODE JSC		6. ADMINISTERED BY (If other than Item 5) NASA/Johnson Space Center Attn: Suzan P. Moody, Mail Code BV 2101 NASA Parkway Houston TX 77058-3696		<div style="border: 2px solid black; padding: 5px; text-align: center;"> APPROVED  JSC PROCUREMENT OFFICER 12/28/2007 </div>	
7. NAME AND ADDRESS OF CONTRACTOR (No., Street, City, Country, State and ZIP Code) CANADIAN COMMERCIAL CORP Attn: Paul Cachia 50 O'CONNER STREET, STE 1100 11TH FLOOR OTTAWA ON K1A 0S6 CA				8. DELIVERY <input checked="" type="checkbox"/> FOB ORIGIN <input type="checkbox"/> OTHER (Specify below)			
CODE 98247		FACILITY CODE		9. DISCOUNT FOR PROMPT PAYMENT NT17		10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN	
11. SHIP TO/MARK FOR NASA/Johnson Space Center 2101 NASA Parkway Houston TX 77058-3696		CODE JSC		12. PAYMENT WILL BE MADE BY NASA/Johnson Space Center Accounts Payable/LF231 2101 NASA Parkway Houston TX 77058-3696		CODE JSC	
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304 (c) () <input checked="" type="checkbox"/> 41 U.S.C. 253 (c) (1)				14. ACCOUNTING AND APPROPRIATION DATA See Schedule			
15A. ITEM NO	15B. SUPPLIES/SERVICES			15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
Continued							
15G. TOTAL AMOUNT OF CONTRACT						\$61,921,254.00	
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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE							
17. <input type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to Issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)				18. <input checked="" type="checkbox"/> AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number _____ including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any condition sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.			
19A. NAME AND TITLE OF SIGNER (Type or print) M. WHITTINGHAM, PRESIDENT				20A. NAME OF CONTRACTING OFFICER KRYSTINE O. BUI Contracting Officer			
19B. NAME OF CONTRACTOR		19C. DATE SIGNED 2/12/07		20B. UNITED STATES OF AMERICA		20C. DATE SIGNED 12/28/2007	
BY  (Signature of person authorized to sign)				BY  (Signature of the Contracting Officer)			

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PART I - THE SCHEDULE

Section B - Supplies or Services and Prices/Costs

B.1 Listing of Clauses Incorporated by Reference

The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference:

I. Federal Acquisition Regulation (48 CFR Chapter 1)

Clause

Number

Date

Title

No FAR By Reference clauses in Section B.

II. NASA Federal Acquisition Regulation Supplement (48 CFR Chapter 18)

Clause

Number

Date

Title

No NASA By reference clauses in Section B.

(End of Clause)

B.2 Contract Value

(a) The estimated cost for complete performance of the basic period of performance of this contract (January 1, 2008 through December 31, 2010) is: \$42,989,606 Canadian Dollars (CD).

(b) The not-to-exceed (NTE) estimate for the Indefinite Delivery/Indefinite Quantity (IDIQ) portion of the contract of the basic period of performance of this contract (January 1, 2008 through September 30, 2010) is \$22,440,000 CD. This estimate includes both fixed-price and cost-plus-fixed-fee task orders.

(c) The value of task orders authorized as of **Task Order 38** is: \$17,068,540 (CD).

(d) The total End of Program (EOP) fee pool for complete performance of the basic period of performance of this contract (January 1, 2008 through December 31, 2010) is 04 of the negotiated fee for Shuttle's work, which is 04 CD. The EOP fee is not applicable to IDIQ task orders or ISS work.

(e) The total End of Program fee earned is: \$_____ (CD).

(f) The total contract value is the sum of paragraphs (a), (c), and (e), and is \$43,387,135 CD.

(End of Clause)

B.3 Contractor/Subcontractor Fee Arrangement

It is specifically understood and agreed that all requirements herein will be performed on a "No-Fee" basis by the Contractor, and any reference in this contract and incorporated clauses to "Fee", "Fixed-Fee", "Profit", or "End of Program Fee", shall be considered to be applicable to the Subcontractor.

The negotiated fee for MDA Brampton's work is ~~b4~~ MDA Brampton's fee for MDA Montreal and Federal's work is ~~b4~~

The negotiated fee for MDA Montreal and Federal's work is ~~b4~~

All negotiated fee rates shall apply to IDIQ task orders that are of a similar nature and complexity of the basic contract.

(End of Clause)

B.4 Canadian Commercial Corporation (CCC) and MacDonald Dettwiler & Associates (MDA) Arrangement

The CCC is an export agency of the Government of Canada which acts as the prime Contractor for this contract. MDA is the first-tier Subcontractor. The CCC provides NASA with a guarantee of contract performance backed by the Government of Canada.

(End of Clause)

B.5 Exchange Rates

The United States Dollar amount stated in this contract may be revised upward or downward if necessary, to equal the Canadian National Dollar amount on a yearly basis, or at any earlier time by issuance of an administrative change by the Contracting Officer. Such adjustment(s) shall be based upon records of actual payments under this contract, using exchange rates determined by the U.S. Treasury.

(End of Clause)

B.6 Scope of Work

The Contractor shall, in a manner consistent with and subject to the terms and conditions hereof, furnish all resources necessary for the requirements of the Statement of Work set forth in Section C.

(End of Clause)

B.7 Contract Funding (NFS 1852.232-81)(Jun 1990)

(a) For purposes of payment of cost, exclusive of fee, in accordance with the Limitation of Funds clause, the total amount allotted by the Government to this contract is \$ 54,318,481 (USD). This allotment is for the contract and covers the following estimated period of performance: January 1, 2008 through **September 30, 2010**.

(b) An additional amount of \$0 is obligated under this contract for payment of fee.

(End of Clause)

[End of Section]

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C.1 Introduction

The purpose of this section is to define the requirements that must be met by the Contractor in the accomplishment of the program as defined by this statement of work (SOW). These requirements include all aspects of support for both previously delivered Shuttle Remote Manipulator System (RMS), Inspection Boom Assembly (IBA), Robotic Work Station (RWS) and Berthing Cues System (BCS) hardware, software, and support equipment as well as items produced and delivered under this contract. Program requirements also include various types of program-related activities and projects in support of the Shuttle and Space Station Programs.

The equipment comprising the RMS was originally designed, developed, certified, and fabricated by Spar Aerospace Limited [now MacDonald Dettwiler & Associates (MDA)], under contract to the Canadian Government for RMS Design, Development, Test, and Evaluation (DDT&E). Subsequent Follow on Production (FOP) was performed under NASA Contracts NAS 9-15712, NAS 9-18552 and NAS 9-97220. In addition to the follow on production of remote manipulator systems for the Shuttle Program, Contracts NAS 9-15712, NAS 9-18552, NAS 9-97220 and NAS 9-03045 provided for the overhaul and repair of RMS hardware, sustaining engineering for the RMS program and its support to the Shuttle Program, the redesign of existing equipment, and the development of replacement hardware and support equipment.

The IBA is the MDA provided portion of the Orbiter Boom Sensor System (OBSS) which was designed to support on-orbit thermal protection system inspection and repair. The IBA was designed, developed and manufactured by MDA under contract NAS 9-03045.

The RWS is the NASA funded portion of the Space Station robotics system. The Space Station robotics were developed as an integrated system by Spar Aerospace Limited (now MDA), with the Mobile Servicing System (MSS) portion of the activity being funded by the Canadian Government. The RWS was designed, developed, manufactured, and delivered under contract NAS 15-10204.

The BCS is used in conjunction with the Space Station Remote Manipulator System (SSRMS) to berth pallets and payloads to the International Space Station (ISS) Common Attach System berthing locations. The BCS was developed as an integrated system, within each carrier system, by MDRobotics (now MDA). The BCS was designed, developed, manufactured, and delivered under contract NAS 9-00089. The intent of this contract is to provide for continuing required Program support, system evolution, and modification of the existing equipment, plus the provision of additional equipment as specified herein.

The Contractor shall be responsible for the final design and fabrication, and therefore, the ultimate flight worthiness of the RMS, IBA, RWS, BCS and other system-related hardware and software, as it may be developed or modified as directed by this contract. The Contractor shall furnish all resources and appropriate contiguous facilities necessary for performance of the requirements of this statement of work and as defined in Task Orders issued under this contract. (DRD 37)

C.1.1 Program Infrastructure, Engineering and Product Support

C.1.1.1 Purpose

The purpose of this section is to describe the responsibilities, activities, and NASA reporting requirements in the areas of program management, engineering and product support to be provided for under this Exhibit and applied to all contractually directed activities. Requirements include management and support to existing delivered RMS, IBA, RWS and BCS equipment, capability retention as the systems' design authority, and continuing evaluation of the systems for replacement or upgrade.

C.1.1.2 Scope

Program Infrastructure, Engineering and Product Support is the portion of the contract providing overall management of projects under the contract covering both existing equipment and future contracted efforts. It also provides a continuing, dedicated level of program experience and system expertise to assure long-term operations support by the systems through the lives of the Shuttle and Space Station Programs.

C.1.1.3 Requirements

Requirements included in this section describe the ongoing program management, engineering, and product support activities required to support the program over the period of performance of this contract.

C.1.1.3.1 Program Infrastructure

The Contractor shall provide necessary resources for program management, administration, and coordination of activities under the contract. The program management group provides the infrastructure for management of all activities under the contract. Responsible for interface to NASA, providing both formal reporting and responses to ad hoc queries related to the Program Management function as well as work as directed by Task Orders.

C.1.1.3.1.1 Program Management

The Contractor shall maintain a program support organization, under the direction of a Program Manager, to conduct those management and support activities necessary to achieve the accomplishment of activities and work specified in this Statement of Work and as directed in Task Orders. Program management provides a layer above project engineering focused on achievement of overall program objectives, management of ongoing activities and inter-dependencies between these activities and Task Orders. Program management provides the infrastructure where Task Orders can be run successfully and leaves the management of individual Task Orders to project engineering. The Program Manager shall have the responsibility and authority required for the accomplishment of the contract activities. In addition, the Program Manager is responsible for submitting to NASA for approval prior to implementation any changes to documents contained in the applicable documents section of this SOW or any change to documents or hardware that shall affect fit, form, function, cost or schedule. A management plan which describes the overall Contractor system for the conduct and

implementation of the SOW shall be prepared and maintained in accordance with the Management Plan DRD 07. The Contractor shall conduct program management in accordance with the approved management plan.

The Contractor shall establish a system for the reporting of all problems and the establishment of corrective action for all problems in accordance with the requirements of Problem Reporting And Corrective Action (PRACA) DRD 22. Responsibility also includes the acquisition of all data and documentation relating to the RMS, IBA, RWS and BCS projects included under this and previous contracts from all Contractor and Subcontractor facilities, the assessment of the completeness of the data, updating of the data where necessary, and assuring the accurate and timely inputting of the data into the database system in order to maintain all, including the most recent data, within the Program's data and configuration management system (Jeeves).

The Contractor shall provide documentation and reports listed in this SOW and Sections B through I of this contract, in accordance with the DRL, DRD, and NASA issued Task Orders. When feasible and cost effective, the Contractor may identify alternative documentation requirements for NASA approval. The Contractor shall consider factors such as cost, schedule, availability of personnel and equipment, task complexity, and other factors that are applicable for recommending alternative methods to meet project or end item requirements.

Program Management also has responsibility for coordination and conduct of formal management meetings, and technical status reviews as required in the following DRDs

DRD 01	Program Review Documentation
DRD 02	Weekly Status Report
DRD 03	Program Plan
DRD 13	Design Review Documentation (Responsible for timely submission of data only. Preparation and presentation of this information is included in specific projects as defined in the Task Orders.)

The Contractor shall support management and technical reviews conducted on a quarterly basis at the Contractor's facility. Overall agenda and emphasis of these meetings shall be based on current activities, issues, and Task Order schedules. A separate review of the Program Plan (DRD 03) and discussions on contractual and budget activities and issues shall be held monthly at JSC.

The Contractor is also responsible for the development and submission of NASA requested Change Requests (DRD 12) for maintenance, upgrades, development, and production work related to the RMS, IBA, RWS and BCS and their continuing Program support.

The Contractor shall maintain a performance management system which reflects the implementation of the Management Plan, DRD 07, to ensure sufficient and effective internal cost, schedule, and technical performance management processes for planning and controlling the effort required in the SOW.

C.1.1.3.1.2 Cost and Schedule

The Contractor is responsible for cost and schedule preparation for all activities under the contract, maintenance of the information, and submission to NASA. The accounting and scheduling system shall be based upon the Work Breakdown Structure (WBS) as specified in DRD 05. Resource budgets shall be established and maintained, and actual expenditures against established budgets are to be identified and reported monthly in accordance with the Contractor Financial Management Report (DRD 06). Total program costs (cumulative and estimates at completion) are to be revised quarterly and also reported in accordance with DRD 06. Schedules shall be baselined upon approval by NASA and progress against approved baselines shall be maintained. Schedule preparation, status, and reporting requirements are contained in Change Request (CR) Schedules DRD 04. Cost data are to be included in the Program Plan (DRD 03).

C.1.1.3.1.3 Data Management

The Contractor shall establish a Data Management Plan as outlined in DRD 08 which includes the implementation and maintenance of an electronic process and shall handle the data and database in accordance with that plan. For purposes of this proposal databases include: Jeeves, Project Information and Mass Data. Data includes, but is not limited to, hardware configuration data (both as-designed and as-built), test and simulation data, anomaly tracking, and other historical data required for future system performance monitoring and trending, and anomaly resolution.

Full and incremental backups of the data shall be conducted on a scheduled basis and the backed-up data shall be stored at on-site and off-site storage locations; file restores shall be readily available.

C.1.1.3.1.4 Software Management

The Contractor shall manage its software development cycle in accordance with the process levels outlined in DRD 29, Software Deliverables. The level for each Task Order shall be specified within the Task Order. The software development process includes the preparation, review, approval, delivery and maintenance of all documentation associated with the development of software applications and simulations, including their operation and features.

C.1.1.3.1.5 Network Infrastructure

The Contractor shall manage its network infrastructure to provide both local and remote appropriately approved access to its applications. Security set-ups shall be audited on a regular basis.

The Contractor shall ensure that their IT staff keeps current with the most prevalent technology, in terms of hardware and software, and their monitoring tools.

Statistics shall be tracked for user support and server downtime.

C.1.1.3.1.5.1 IT Security

The contractor shall ensure that appropriate levels of integrity, availability, and confidentiality are applied to the protection of all sensitive information and systems in support of the missions, programs, and functions. This includes the development and maintenance of the IT Security Plan for the SRMS Servers (DRD 41).

C.1.1.3.1.6 Program Product Assurance

The Contractor shall be responsible for the Management of the Product Assurance function. The Contractor shall also be responsible for certain Assurance elements that are not specifically included in an approved Change request, as follows:

- NASA and GIDEP ALERTS and participation in the GIDEP process (DRD 11),
- Configuration management (e.g. field requests for drawings and technical documents),
- Reliability and safety analysis and their implementation including system level FMEA and criticality analysis,
- Software assurance including software safety analysis,
- MRB and failure analysis for integrated systems, hardware and software,
- Maintenance of program records not directly controlled by CADM: these relate to maintenance, repair, or production of flight and test hardware.

C.1.1.3.1.7 Jeeves, Web Jeeves and Mass Data Maintenance

The contractor shall be responsible for the maintenance of Jeeves, Web Jeeves and the Mass Data program tools. The contractor shall perform maintenance, upgrades and implementation of non-conformances as required to ensure ongoing operation and data integrity. This activity includes upgrades SQL database, PowerBuilder, EA server and the implementation of non-conformances as required to ensure supportability, security, data integrity, and compliance with program business logic.

C.1.1.3.2 Engineering Support

C.1.1.3.2.1 Sustaining Engineering

The Contractor shall provide for engineering support to hardware and software, and special activities related to flight operations planning, including analysis and assessment of hardware as designed and as delivered as well as specialized simulation and analysis skills to support operational planning and assessments. The Contractor shall also provide for system and program engineering to long-term program planning and shall provide recommendations for developmental projects and for additional or improvements to existing specialized support systems, databases, and tools used to accomplish the requirements of this statement of work. Specialized skills in the areas of systems, electrical, mechanical, structural, and software engineering as well as controls and analysis are required.

Also included under this activity is support of authorized routine NASA and Contractor activities, and responses to information and problem queries provided through the NASA Contracting Officer's Technical Representative (COTR), on hardware, software, system, and configuration.

C.1.1.3.2.1.1 SRMS Technical Authority

The Contractor shall provide technical management of all aspects of the SRMS program, including the integrated SRMS system, the IBA, and their separate components and supporting engineering tools. The technical management area encompasses the establishment of requirements for design, development, testing,

operation and sustaining engineering activities in accordance with program requirements and within the cost and schedule guidelines provided by the program office. Technical management shall assure the coordination of overall program technical activity within and between MDA (Brampton), MDA Federal-Houston and KSC. The technical manager provides technical liaison with NASA and serves as the MDA CCB chairman.

C.1.1.3.2.1.2 SRMS Design Authority Liaison

The contractor shall provide technical engineering expertise to the RMS and OBSS community as the OEM design authority with specific expert knowledge covering all aspects of the SRMS and IBA flight hardware, electronics and software elements. This task also includes assessing the readiness of the SRMS and IBA for flight as part of the CoFR process. Included in this activity is multi-disciplinary engineering support; i.e. systems, electrical, mechanical, software, thermal, structural and materials engineering for the SRMS, IBA, and subsystem elements.

Included are maintaining system requirements and the allocation of these requirements to each subsystem and component, maintaining interface relationships between elements (system and sub-system ICDs) and maintaining SRMS and IBA test requirements for system and subsystem elements. Design documentation shall be maintained including technical review and approval of drawings, schematics, specifications and engineering change notices dealing with flight hardware, test equipment, software and test procedures/requirements. Safety/Failure Modes and Effects Analysis (FMEA)/Critical Items List (CIL) and Hazard Reports shall be maintained. Technical support to review and update NASA SRMS and OBSS technical documentation (including OMRSD, SODB, GPC Flight Software changes, SSSH drawings) shall be provided. The contractor shall perform structural analysis of the SRMS and IBA and associated grapple fixture (GF) interactions to support certification of flight readiness including maintenance of SRMS and IBA structural models as required to support this work.

The contractor shall also conduct periodic technical reviews of requirements, specifications and recommend changes as appropriate, to take advantage of the lessons learned from flight experience and ground tests. The contractor shall chair and participate in the SRMS Problem Resolution Team (PRT) meetings, participate in the Robotic Analysis Working Group (RAWG) and co-chair the Math Model Working Group.

C.1.1.3.2.1.3 SRMS Trending, Diagnostics and Performance Analysis

The contractor shall provide multi-disciplinary engineering effort required to perform SRMS and IBA system and subsystem trending, diagnostics and performance analysis.

Included in this activity is maintaining and populating Mass Data System with flight, ground and simulation data, trending and compiling of SRMS and IBA life cycle and performance data, compiling SRMS and IBA on-orbit and ground test trending documentation and review of planned versus actual hardware usage to identify life restrictions or other concerns. Also included are analyses and diagnostics of hardware

elements following rework and pre & post refurbishment activities, performance prediction and assessment to support MOD payload planning activities, community queries, and flight specific software loads. This task also includes the development and maintenance of engineering tools, simulation models and methodologies as required supporting health monitoring, diagnostic capability and verification of system performance.

C.1.1.3.2.1.4 SRMS System Safety, Reliability and Performance Improvements

The contractor shall identify and assess new processes, techniques and technologies to maintain and improve system safety, reliability and performance including flight hardware, ground support equipment and infrastructure. This includes the assessment and investigation of systematic issues or concerns that could potentially reduce expected SRMS or IBA life, reliability or safety.

C.1.1.3.2.1.5 RWS / BCS / GF Sustaining Engineering

The contractor shall provide sustaining engineering skills for the RWS, BCS and Grapple Fixtures (GF). The contractor shall also provide ISS Program Office Robotics Support (IPORS).

C.1.1.3.2.1.5.1 Assumptions

- a. There is no allowance for subcontractor or any services outside of MDA for the investigation of RWS, EBCS or GF anomalies.
- b. There is no allowance for the repair and overhaul for failed or damaged RWS, EBCS or GF components.
- c. RWS flight support shall be provided at the CSA OEC for one shift only, on call support provided otherwise. There is no allowance for EBCS or GF flight support at the OEC or MER (on call support available within limitations of the LOE). Support to the following flights profile is included;
 - FY08 - 3 flights (no support to HST)
 - Stage Support – on call support only
 - FY09 - 4 flights (15A, 17A, 2J/A, ULF3)
 - Stage Support – on call support only
 - FY10 - 4 flights (19A, 20A, ULF4, ULF5)
 - Stage Support – on call support only
 - FY11 - 0 flights
 - Stage Support – on call support only
 - FY12 - 0 flights
 - Stage Support – on call support only
 - HTV Support – on call support only to missions
- d. Software development support is reduced to a maintenance level from March 2008 onwards. Any software development other than that required to maintain the configuration as of that date shall be covered by a separate ID/IQ Change Request. Furthermore, the software development team is reduced to 2EP in 2010 and Option 1 and Option 2.
- e. Requests to support software planning and evaluation activities may result in a consequent delay in other software activities.

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- f. There is no allowance for any support to RWS test activities at SSTF/ISIL or at any other processing or subcontractor sites.
- g. The level of effort available for support tasks (QA, PA, safety, materials, CADM) is reduced after 2009 on the assumption that the software development and any hardware development/repair is complete as of that date. Should this assumption prove false, and additional software or hardware activity is added through an ID/IQ Change Request, then the additional support effort shall be included in that CR.
- h. Support to the EBCS alignment on payloads is limited to two alignments in FY09 and two alignments in FY10. Any thereafter would be subject of an ID/IQ CR.
 - FY08 0 alignments
 - FY09 2 alignments (ELC1, ELC2)
 - FY10 2 alignments (ELC3, ELC4) to be completed by Mar 31.
 - FY11 0 alignments
 - FY12 0 alignments
- i. There is no provision for EBCS support after Mar 31/10. If required, EBCS support provided shall be subject of an ID/IQ CR.
- j. No support to COTS related activities is included. If required, support would be subject of an ID/IQ CR.
- k. Russian Element support is included as part of the Grapple Fixture sustaining engineering and is limited to telecom support, review and comment on NASA provided documents and general questions and answers and includes one MDA person attending one TIM in Moscow in FY09. Generation of design and analysis products and production effort related to the Russian Elements, if required, shall be subject of an ID/IQ CR.
- l. There is no T&L included for any activities other than RWS flight support and EBCS alignments.

C.1.1.3.2.1.5.2 RWS Sustaining Engineering

This task provides overall RWS technical and management expertise, including specialized skills in the areas of software, systems, electrical, and mechanical. Where required engineering specialties including safety engineering, quality assurance shall be subject of ID/IQ task orders. It includes a function responsible for the management of resources for the RWS, for the technical integrity and performance of the RWS and for compliance with ISS/RWS requirements. Additionally this task shall provide engineering expertise for program planning, recommendations for additional improvements, specialized support systems, databases and tools, and product configuration management required to support the RWS program.

General:

- Operations and Flight Support at the CSA Operations Engineering Complex (OEC) and MSEF for Flight and stage operations, as required.

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- Engineering review and approval of RWS associated engineering change notices dealing with flight hardware, test equipment, software, test procedures/requirements, or specifications.
- Providing MSS level systems and software engineering expertise as applicable to RWS for the identification and evaluation of enhancements.
- Participation in planning conferences and reviews associated with RWS hardware and software.

Hardware:

- Identification of future hardware updates.
- Assessment and review of existing schematics and drawings and update as necessary.

Software:

- Support for integration, verification and testing of the Formal Qualification Test (FQT) software changes at MDA-Brampton.
- Delta FQT identification/support of dispositions resulting from test configurations or customer requests.

Testing:

- Test Configuration support for test configuration SSTF/ISIL is not included. If required by NASA, this support shall be covered by a separate (ID/IQ) change request.
- RWS testing support at processing sites and other sites, as required by NASA, shall be covered by a separate (ID/IQ) change request.

Non-Conformances/Rework:

- Response to NASA information and problem queries with regard to hardware, software, system, test equipment and configuration.
- Engineering expertise for anomaly investigations and for off-nominal RWS equipment performance during operation or test.
- Engineering participation in material and problem review boards and related actions or analyses associated with in-house and NASA activities (in support of RWS program non-conformances).

Documentation:

- Configuration control of deliverables.
- Preparation of weekly reports (DRD Item 02), monthly reports and project scheduling requirements (DRD 03 & 04).

Support from MDA (Montreal) to the activities listed below:

Program Management Infrastructure

- Includes management, program control and Product Assurance at the subcontractor facility as well as reporting

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from the subcontractor to MDA-Brampton for activities within this work scope.

- Includes provision for freight and courier costs.

Mission Support

- Provision for MDA Montreal systems or electronics hardware expertise to mission or stage operations shall be provided by on-call support included in the Systems Engineering allowance (see below).
- No allowance for attendance at the CSA Operations Engineering Complex or MER is included

Software Engineering

- No provision for MDA-Montreal Software Engineering support is included in this work scope.

Systems Engineering

- Includes provision of Electronic Hardware expertise to queries, MRBs, teleconferences and technical investigations. Planning, top level design implementation and trade off analyses are not included (covered, as required, under separate work orders).

Logistics Engineering

- Includes management of storage and traceability of the RWS Government Owned EEE and Mechanical Parts Inventory, disbursement to support repair and overhaul, manufacture and test, support to government audits and shipping or disposal of government property.
- Includes provision of annual EEE parts inventory and 1018 reports to MDA-Brampton.
- Coverage for this is included from January 2008 through September 2011. By end-September 2011, it is assumed all Government Owned parts are shipped to NASA.

Ground Facilities and Integration and Testing

- Includes storage of jigs and fixtures, board and unit level Special Test Equipment including Engineering Model Units (RWS-A and Hi-Fi CEU) used with the STE.
- Includes diagnosis of failures of units located at MDA-Montreal and completing minor repairs.
- Includes periodic testing of Golden Unit and Hi-Fi FEU to verify availability to support STE testing and/or mission support.
- Investigation, repair, and modifications to the STE at customer's sites is not included (covered, as required, under separate CRs).
- Coverage is included from January 2008 through September 2010 only.

Houston Liaison:

- On-site support for the day to day activities at the SSTF relating to the Mobile Servicing System (MSS) and the resolution of technical issues arising from those activities. This activity finishes in September 2008.

Technical Management: The technical management function, RWS Sustaining Engineering, is responsible for:

- Sustaining engineering of the RWS.
- Providing final technical authority for the content of design, certification, qualification and acceptance documentation, analyses, test data and design reviews.
- Evaluation of the RWS and support systems (e.g. test equipment) for enhancements or upgrades to the baseline design.
- Evaluate the need for special purpose tools and methodologies for flight data analysis, trend analysis, and simulation models to verify the performance of the RWS.
- Response to GIDEP Alerts as applicable to RWS through FY10. Response to GIDEP Alerts after FY10, if required, shall be covered by ID/IQ CR.
- Conducting acceptance reviews for all items delivered to NASA

C.1.1.3.2.1.5.3 BCS Sustaining Engineering

This task shall provide for overall BCS technical expertise, including specialized skills in the areas of software, systems, electrical, mechanical, structural and safety engineering on a task-by-task basis. This includes the following:

- Engineering expertise of anomaly investigations and off-nominal EBCS equipment performance during operation or test.
- Response to NASA information and problem queries with regard to hardware, software, system, test equipment and configuration.
- Engineering participation in material and problem review boards and related actions or analyses associated with in-house and NASA activities. These MRBs are in support of EBCS program non-conformances.
- Engineering review and approval of EBCS associated engineering change notices dealing with flight hardware, test equipment, software, test procedures/requirements, or specifications.
- Configuration control of deliverables.
- Assessment and review of existing schematics and drawings and update as necessary.
- Participation in reviews associated with EBCS hardware and software.
- Maintenance of detailed EBCS Installation Manual and drawings.

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- Preparation and maintenance of procedures and operating manuals for EBCS installation, alignment and test equipment provided to NASA through the EBCS sustaining program.
- Operations and Flight Support.
- Attendance at EBCS planning conferences.
- Providing final technical authority for the content of design, certification, qualification and acceptance documentation, analyses, test data and design reviews.
- Evaluation of the EBCS and support systems (eg. test equipment) for enhancements or upgrades to the baseline design.
- Evaluate the need for special purpose tools and methodologies for flight data analysis, trend analysis, and simulation models to verify the performance of the EBCS.
- Response to GIDEP Alerts as applicable to EBCS.
- Conducting acceptance reviews for all items delivered to NASA
- Support to the EBCS alignment on payloads is limited to two alignments in FY09 and two alignments in FY10. Any thereafter would be subject of an ID/IQ CR.

C.1.1.3.2.1.5.4 GF Sustaining Engineering

This task provides for responding to NASA inquiries related to Grapple Fixtures. This includes performance of unscheduled investigations, authorized routine analyses and studies, and preparation of summary presentations. NASA operates approximately 100 FRGF's, 12 PVGFs, 4 PDGFs, and several EFGFs and RSGFs delivered by MDA for the Space Shuttle and ISS Programs. This contract ensures continuing provision of routine post-delivery support. This comprises the following major activities related to grapple fixtures:

- Engineering expertise of anomaly investigations and off-nominal equipment performance during off-line testing, formal in-process and acceptance tests.
- Response to NASA (JSC, KSC, and MSFC) information and problem queries with regard to hardware, system, test equipment and configuration.
- Engineering support to material and problem review boards and related actions or analyses associated with in-house and KSC activities.
- Engineering review and approval of associated engineering change notices dealing with flight hardware, test equipment, test procedures/requirements, or specifications.
- Assessment and review of existing product definition documentation, and certification queries.
- Development, maintenance and retention of the specialized skills that are required by the engineering group to ensure a knowledge base sufficient to provide continued support for all grapple fixtures (ie FRGFs, EFGFs, RSGFs, PDGFs and PVGFs).
- Reduced support is included in FY10 through FY12, based on completion of Russian Segment Reconfiguration and reduced number missions involving payloads with Grapple Fixtures.

- No provision for travel to support Russian Segment Reconfiguration is included. If required by NASA, travel shall be covered by an ID/IQ CR.

C.1.1.3.2.1.5.5 IPORS

This task provides level of effort support to the ISS Program office. The support team is based at the MDA Federal (Houston) office. The work involved includes engineering analysis, test support and problem resolution. Included are the following major activities in support of the ISS Program Office:

- Programming and engineering analysis support for insertion of specific Space Station robotic models into NASA simulator software.)
- Production of deliverables associated with Space Station robotics flight operations for FY08 only.
- Trick Model Development is assumed to be complete in FY09. Support shall be provided at a reduced level thereafter.

C.1.1.3.2.2 KSC Support

The Contractor shall provide design authority liaison to KSC and its support contractors for activities at KSC which include processing, testing, and installation of RMS, IBA, RWS, BCS, and program-related flight hardware, and support to planning and implementation of maintenance of electrical and mechanical ground support equipment located at the launch site. Responsibilities also include engineering liaison and coordination between KSC and the Support Contractor for supported systems' information provision and exchange. The Contractor is responsible for maintenance of supported systems' documentation required to support processing at KSC and providing system engineering support for anomaly resolutions during system checkout and installation.

C.1.1.3.2.3 JSC Support

The Contractor shall provide experienced system engineering design authority liaison to JSC in the areas of mission planning, flight operations, and ongoing engineering requiring design authority input. The Contractor shall also provided experienced network communications, and database system support related to remote access of Program databases, NASA user queries and problem resolution related to data and databases, and the coordination and implementation of changes to the system in support of JSC system access.

C.1.1.3.2.4 SRMS Flight Support (IDIQ)

The contractor shall provide flight support for Shuttle flights involving the SRMS and OBSS. This support shall consist of technical expertise to NASA in the mission development cycle, real-time flight support and pre- & post-mission evaluation. Pre-mission activities include review and comment on Flight Rules, Malfunction Procedures, Hazard Reports and Operations Checklists, support to Flight Techniques Meetings, flight specific analyses, support to enquiries from MOD in the pre-mission planning function, preparation of pre-flight briefing and RMS and OBSS timeline. Real-time flight support activities include providing real-time support at JSC/KSC, maintenance of the RMS console logs, monitoring of SRMS and IBA performance,

support to anomaly investigations and attendance at Mission Management Team meetings. Post-mission activities include preparation of post-mission report, trending information, support to post-mission investigation of any on-orbit anomalies and participate in crew debriefs.

C.1.1.3.2.5 ASAD Maintenance

The contractor shall provide the ongoing maintenance of the ASAD simulator as required to support operation of the SRMS and IBA. This includes maintenance, upgrades and implementation of non-conformances as required to ensure the ongoing operation and validation of the simulator. This activity includes the implementation of new math models, simulation code or non-conformances, as required to ensure supportability and validation of the simulator.

C.1.1.3.3 Product Support

The Contractor shall be responsible for implementing contract requirements in the areas of Product Assurance (PA), logistics planning, and test equipment support and maintenance, and assure reliability and maintainability of the ground support and flight systems.

C.1.1.3.3.1 Product Assurance

These product assurance elements shall be included in approved Task Orders for IDIQ tasks and shall be provided by the contractor for core tasks.

The Contractor is responsible for PA responsibilities which include the implementation requirements related to hardware reliability and maintainability, parts, software development, materials and processes, quality assurance, and field support services to Subcontractors.

The Contractor is responsible for the provision of support for the maintenance of documentation not directly controlled by CADM related to maintenance, repair, or production of flight and test hardware. Also included in PA responsibilities is support to assessments of the safety and reliability requirements of the program and their implementation including system level FMEA activity, criticality analysis, failure analysis, trend analysis and screen strengths.

The Contractor shall follow the three Process Levels A, B and C (PE-PR.047 refers) as stated below. Levels A and B are generally defined and driven by; catastrophic failure consequences; mission critical needs; reliability and safety needs. Where a conflict occurs between contract requirement and the applicable contractor's process levels, the contractual requirements shall take precedence. The requirements stipulated here may be tailored in accordance with the type of requirement to the program to which they apply. When safety/reliability issues warrant a higher process level, this shall be dictated by program. The three process levels shall be mapped into product areas within the following general criteria:

- Generically targeted by Product (End Item)
- Depending on Task complexity and End Item (Product) type.

1. Process Level A – example:

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- Safety Critical Manned Space Products Baseline. Mission Critical Unmanned Space Products.
- On a case-by-case basis, based on need to ensure mission success. Mission Critical Components are normally developed under Level B processes.

2. Process Level B – example:

- Unmanned Space Products and Components Baseline. Generally driven by Reliability needs.
- Mission Critical Manned Space Products & Components (e.g. FSE or lights, cameras respectively) - with NASA concurrence.
- GSE Components interfacing with Product - driven by potential to induce failures into the Product.
- Models used for formal Product Verification and Buyoff e.g. Finite Elements, Thermal and Simulation models.

3. Process Level C – example:

- Ground Support Equipment Products Baseline e.g. GSE Components which do not interface with the Product.
- Development Support Baseline. Breadboards, EM, Prototypes; Data Analysis tools and S/W, Test scripts, support equipment.

The Contractor is responsible for implementation of contract requirements contained in SAE AS9100, NSTS 5300.4 (1D-2) and the following DRDs (with the exception that OTS parts and assemblies shall be in accordance with Paragraph C.1.3.3):

DRD 09	Quality Manual
DRD 10	Plan, Safety and Health
DRD 11	Documentation, NASA and Government Industry Data Exchange
Program	(GIDEP) ALERT System
DRD 14	Analysis, Failure Modes and Effects (FMEA) and Critical Items
List (CIL)	
DRD 15	Plan, System Safety
DRD 16	Report, Safety Analysis and Hazard
DRD 18	Acceptance Data
DRD 19	List, Limited Life Item
DRD 20	Package, End Item Shipping Documentation
DRD 22	Report, Problem Reporting and Corrective Action (PRACA)
DRD 24	Report, Material and Processes (M&P) Summary and Material Usage Agreement(MUA)
DRD 25	Request, Non-Standard EEE Parts Approval (NSPAR)
DRD 26	Requests, Waiver/Deviation Approval
DRD 27	Request, SRMS Certification Approval (SRMSCAR) and Government Certification Approval Request (GCAR)
DRD 28	Plan, Product Assurance
DRD 30	Report, Software Safety Analysis
DRD 31	Plan, Reliability & Maintainability
DRD 32	Contract End Item (CEI) Specification and Verification Plan
DRD 33	Certification Data Package (CDP)
DRD 34	EEE Parts Control

DRD 35 Report, Non-Conformance (NCR) – Jeeves Database

The Contractor's Product Assurance Manager or their designee shall convene MDA's Material Review Board (MRB) involving hardware and software activities, failure investigations, and implementation and closure of Failure Investigation Action Report (FIAR) DRD 22 on flight hardware. MRB's may be convened related to both hardware in development or manufacture as well as to delivered hardware. MRB Approval Requests shall be submitted to NASA for approval prior to use of the articles or materials that are not in conformance to contractual Class I specifications or quality requirements. Non-conforming articles shall be held in a quarantine store pending MRB disposition approval.

C.1.1.3.3.2 Configuration Control

These configuration control elements shall be included in approved Change Requests for IDIQ tasks and shall be provided by the contractor for core tasks.

The Contractor shall establish and maintain a configuration control system capable of defining the configuration of previously delivered and new hardware, software, and equipment, including hardware used for qualification and certification testing. The configuration system shall be able to identify the configuration of program hardware and software provided under this or previous contracts at any point from the first build of piece parts to the completed system which is ready for delivery to the United States Government. The system shall provide for the identification of as-designed configuration baselines, the control of changes to those baselines, the maintenance of current configuration accountability, and verification that the as-built configuration conforms to the documented configuration baseline as amended by approved changes. Documentation shall be available through the data and configuration management system, Jeeves (see paragraph C.1.1.3.1.3), and be provided as required in support of design reviews (DRD 13).

The configuration control system shall also control the configuration of all MDA published documents and all software produced for use under this and previous contracts. Control of changes shall be accomplished through a change process as defined in DRD 23, Engineering Change Notices (ECN's).

C.1.1.3.3.3 Maintenance and Logistics Planning

Responsibilities include assessments of flight hardware and ground support equipment, flight hardware usage and trend data, spares inventory management, spares planning, and preparation of recommendations for ground system maintenance, upgrade, or replacement activities and flight and ground systems spares procurements for presentation to the JSC COTR required for continuing safe and reliable systems support to the Shuttle and Space Station Programs. Recommendations shall include the scope of recommended work, technical details and justification, and recommended scheduling.

C.1.2 Hardware Logistics, Maintenance, Overhaul, And Repair

C.1.2.1 Purpose

The purpose of this SOW is to describe the requirements for servicing, maintenance, and repair as required to system hardware, software, and support equipment and to provide for that work.

C.1.2.2 Scope

The Contractor shall perform the activities as defined within this portion of the SOW for those activities required to maintain flight hardware and support equipment in flight ready status.

C.1.2.3 Requirements

The Contractor shall provide for the maintenance, overhaul, repair, upgrade and replacement logistics activities for all Program hardware and software, and related support and test equipment required to maintain flight systems and prevent deterioration in system reliability and operating safety. These activities include both scheduled and unscheduled maintenance.

SR&QA requirements for hardware logistics, maintenance, overhaul and repair shall be in accordance with paragraph 1.3.3.5.

Manufacturing requirements for hardware logistics, maintenance, overhaul and repair shall be in accordance with paragraph 1.3.3.6.

Transportation requirements for hardware logistics, maintenance, overhaul and repair shall be in accordance with paragraph 1.3.3.7

C.1.2.3.1 Logistics (IDIQ)

The Contractor shall perform the activities required for the production, repair, or replacement of spares.

C.1.2.3.2 Maintenance

The Contractor shall perform the activities required for the maintenance of hardware and related support equipment. Hardware and related support equipment includes flight hardware, ground units, and test equipment.

C.1.2.3.2.1 Investigation & Support of Delivered SRMS Flight Hardware

The contractor shall provide support to initial investigations into anomalies that occur on SRMS and IBA flight hardware. This includes the testing and disassembly for investigation after the hardware has been returned to the contractor for investigation. Also included are investigations into anomalies on hardware being worked under an ID/IQ task, where the anomaly is outside of the scope of that task order.

C.1.2.3.2.2 SRMS Test Equipment Support

The contractor shall support and maintain the SRMS and IBA test equipment, tooling and provide support to integration and test activities. This includes the calibration and maintenance of test equipment and peripheral equipment (connector savers, cables, jigs, fixtures, break-out boxes) as required to support program test activities. Also included

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are rental of test equipment or data recording equipment as necessary to support program testing or investigations as well as supervision and skills retention so that technical personnel directed to carry out build, handling and testing of SRMS and IBA hardware are properly instructed and aware of program requirements.

C.1.2.3.3 Repair and Overhaul (IDIQ)

The Contractor shall perform Repair and Overhaul (R&O) activities. This effort shall be provided by the Contractor at locations including, but not limited to, JSC, KSC, MDA, and Subcontractors'.

C.1.2.3.4 Hardware Upgrade (IDIQ)

The contractor shall perform hardware upgrade activities which incorporate previously qualified design changes into flight hardware and bring hardware into compliance with the latest as-designed configuration. Upgrades to two end effectors are required and should occur in FY2008 and FY2009 (one each year).

C.1.3 Hardware Development and Production (IDIQ)

C.1.3.1 Purpose

The purpose of this SOW is to describe the requirements for system hardware design or redesign, development, certification, and production.

C.1.3.2 Scope

The Contractor shall perform the activities as defined within this portion of the SOW for those activities required for replacement and/or additional hardware development and production to ensure operation throughout the life of the Shuttle and Space Station programs.

C.1.3.3 Requirements

The Contractor shall provide for the design, development, fabrication, assembly, integration, test, and delivery of hardware. Meetings and reviews specified as requirements to specific activities under this Exhibit are to be included as part of those activities for cost and planning purposes. However, coordination and conduct of these reviews are the responsibility of the Program Manager. Types of reviews that may be held as part of activities under this Exhibit include Design Reviews (DRD 13), Configuration Verification Reviews, and Acceptance Reviews (DRD 18). End Item Data Package requirements are contained in DRD 20.

The evaluation and control of OTS parts and assemblies shall be in accordance with EEE Parts Control DRD 34 and MDA-RMS-PA.2533, OTS Methodology.

C.1.3.3.1 System Requirements

C.1.3.3.2 Performance Requirements and As-Designed Configuration

Contract End Item (CEI) Specification and Verification Plan (DRD 32) shall substantiate the performance, design, and verification requirements of the system. A configuration management system shall be established to meet the requirements of NASA and configuration control of the system shall be in accordance with that configuration management system. All system performance changes and all

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manufacturing, test, and configuration changes shall be proposed through the Task Order process outlined in DRD 12, and implemented if approved into the appropriate documentation through the configuration management system.

Acceptance of the deliverable hardware items shall be in accordance with the approved Test Procedures (DRD 17). An End Item Data Package (DRD 20) shall be prepared to provide complete documentation at the time of acceptance of a contracted end item. Any off-the-shelf manuals or documentation purchased separately or as part of hardware or software purchased required to operate the deliverables to are also considered deliverable items (DRD 21).

Certification shall only be required as re-certification due to a hardware change. Any certification activities shall require the completion of the Certification Data Package (CDP) (DRD 33), which shall be used to provide objective evidence to NASA that the delivered item meets the requirements, the CDP, when approved, is the NASA certification. Certification activities shall be statused along with other program activities weekly (DRD 02), monthly (DRD 01), and documented in the Program Plan (DRD 03).

C.1.3.3.3 Parts, Assemblies and Materials

The Contractor shall ensure that selected parts and assemblies are of sufficient quality and reliability to allow the hardware to meet its allocated programmatic and performance requirements. A Plan for Parts, Assemblies and Materials Control and Verification shall be established and implemented. The plan shall define the controls on selection, evaluation, testing (as applicable), applications, acquisition, handling and installation of mechanical parts, EEE parts and assemblies, and materials on this program. The Contractor, in implementing this plan, shall have the flexibility of using the spectrum of parts and assemblies available. The Contractor's plan shall have controls to assure that the parts and assemblies selected and used do not have known generic problems (Industry, NASA and GIDEP Alerts, DRD 11). The Contractor's materials and processes control programs shall be in accordance with SE-R-0006D. For nonmetallic materials which the contractor proposes to change, the contractor shall submit the appropriate Materials and Processes Summary Report or where deemed necessary a Materials Usage Agreement (MUA) approval forms for NASA review and approval prior to use of the materials per DRD 24.

C.1.3.3.4 System Verification

The Contractor shall maintain and update as necessary the Contract End Item (CEI) Specification and Verification Plan (DRD 32), in particular the contents of the Requirements Verification Matrix. Detailed requirements covering the Performance Specification and System Requirements Implementation Specification are also covered in DRD 32. Production verification shall cover the following areas:

1. Re-certification, if required
2. LRU Acceptance Tests
3. System Acceptance Tests
4. Integrated Checkout Requirements (RMS/Orbiter, RWS/Space Station, etc.)

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Further, the Contractor shall review the performance specification for end items covered by this statement of work for compliance with NSTS 08080-1 requirements. This compliance review should be carried out if either the performance specification or NSTS 08080-1 requirements change.

C.1.3.3.5 SR&QA Requirements

C.1.3.3.5.1 Quality Assurance Requirements

The contractor shall have a quality program that complies with international organization for standardization document SAE AS9100 – Model For Quality Assurance In Design, Development, Production, Installation And Servicing

C.1.3.3.5.1a Customer Verification of Subcontracted Product

The Contractor shall submit procurement documents to the designated NASA quality representative for determination of the need for Government Source Inspection (GSI) prior to release of the procurement.

(a) Procurements which require GSI shall include the following statements:

"All work on this order is subject to inspection and test by the Government at any time and place. The Government quality representative who has been delegated quality assurance functions on this procurement shall be notified immediately upon receipt of this order. The Government representative shall also be notified 48 hours in advance of the time articles or materials are ready for inspection or test."

(b) Procurements which do not require GSI shall include the following statement:

"The Government has the right to inspect any or all of the work included in this order at the supplier's plant."

C.1.3.3.5.2 Problem Reporting and Corrective Action (PRACA)

The Contractor shall maintain a system for problem reporting and corrective action in accordance with DRD 22, Problem Reporting and Corrective Action (PRACA).

C.1.3.3.5.3 Software Quality Assurance

A Software quality assurance function shall be implemented in accordance with PE-PR.047 and PE-PR.040, to ensure the software development process and deliverables shall meet the requirements of DRD 29.

C.1.3.3.5.4 Reliability Requirements

The Contractor shall maintain a reliability program in accordance with NSTS 5300.4 (1D-2) and DRD 31 to assure compliance with NASA requirements, with the exception that all OTS parts and assemblies shall be in accordance with Paragraph C.1.3.3. Reliability progress shall be statused along with other program activities weekly (DRD 02), monthly (DRD 01), and be documented in the Program Plan (DRD 03).

C.1.3.3.5.5 Occupational Safety Requirements

The Contractor shall maintain an occupational safety program complying with the requirements of Safety & Health Plan DRD 10 and Clause 18-52.223-70.

C.1.3.3.5.6 System Safety Requirements

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The Contractor shall maintain a System Safety Program in accordance with JSC 17481 to assure compliance with JSC Space Shuttle flight equipment requirements.

The Contractor's safety organization shall also perform a review of proposed waivers/deviations to their submission to NASA (DRD 26).

C.1.3.3.6 Manufacturing Requirements

C.1.3.3.6.1 Soldering Requirements

The Contractor shall conform to a soldering program which complies with the requirements of NASA publication NASA-STD-8739.3, Requirements for Soldering Electrical Connections. For soldering of 'Electronic Assemblies' see C.1.3.3.6.8.

C.1.3.3.6.2 Circuit Boards

Printed Circuit Boards (PCBs) that are designed, redesigned, or procured Off-The-Shelf (OTS) shall meet the requirements of the following IPC specifications.

PCB Design:

- i) IPC-2221 Generic Standard on Printed Board Design
- ii) IPC-2222 Sectional Standard on Rigid Organic Printed Boards
- iii) IPC-2223 Sectional Design Standard for Flexible Printed Boards

PCB Acceptance:

- iv) IPC-A-600 Acceptability of Printed Boards
- v) IPC-6011 Generic Performance Specification for Printed Boards
- vi) IPC-6012 Qualification and Performance Specification for Rigid Printed Boards
- vii) IPC-6013 Qualification and Performance Specification for Flexible Printed Boards

The performance classification of the PCBs (i.e. IPC Class 1, 2, 3) shall be determined based on the criticality of the end item application.

In addition, Goddard Supplement S312-P-003 shall be used in conjunction with the defined IPC specifications for Flight PCB application

C.1.3.3.6.3 Surface Mount Technology

The Surface Mount Technology workmanship shall be in accordance with NASA-STD-8739.2, Workmanship Standard for Surface Mount Technology.

C.1.3.3.6.4 Conformal Coating

Staking and conformal coating requirements shall be in accordance with NASA-STD-8739.1, Workmanship Standard for Staking and Conformal Coating of Wiring Board Assemblies.

C.1.3.3.6.5 Reserved

C.1.3.3.6.6 Crimping, Interconnecting Cables, Harnesses and Wiring

The Contractor shall comply with the requirements of Crimping, Cables, Harnesses and Wiring NASA-STD-8739.4, Workmanship Standards for Interconnecting Crimping, Cables, Harnesses and Wiring.

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C.1.3.3.6.7 Fiber Optics

The Contractor shall comply with the requirements of NASA-STD-8739.5, Fiber Optic Terminations, Cable Assemblies, and Installation.

C.1.3.3.6.8 Electronic Assemblies

For electrical and electronic assemblies designed or redesigned under this contract, the Contractor shall comply with the requirements of IPC/EIA J-STD-001 Joint Industry Standard Requirements for Soldered Electrical and Electronic Assemblies and IPC-A-610, the Acceptability of Electronic Assemblies.

For electrical and electronic assemblies purchased off-the-shelf (OTS) under this contract, the Contractor shall comply with either the requirements of IPC/EIA J-STD-001 001 Joint Industry Standard Requirements for Soldered Electrical and Electronic Assemblies and IPC-A-610, the Acceptability of Electronic Assemblies, or shall be in accordance with MDA-RMS-PA.2533, OTS Methodology.

In addition for 'flight (hardware) applications' not purchased as OTS equipment, the following additional requirements shall be employed;

- A Training and Certification Program shall be in accordance with NASA STD 8739.3, Soldering Electrical Connections Section 5;
- Staking shall be in accordance with NASA-STD-8739.1, Workmanship Standard for Staking and Conformal Coating of Wiring Board Assemblies.

C.1.3.3.6.9 Non-destructive Inspection Requirements

Nondestructive inspection requirements for materials and parts shall be in accordance with MIL-HDBK-6870A.

C.1.3.3.6.10 Electrostatic Discharge (ESD) Control

The Contractor's ESD Control Program shall comply with the requirements of ANSI/ESD S20.20-2007, Development of an Electrostatic Discharge Control Program for – Protection of Electrical and Electronic Parts, Assemblies and Equipment.

C.1.3.3.6.11 Temporary Installations

Temporary closure devices and indicators (plugs, cover, streamers) shall be of high-visibility color, or shall have attached colored streamers to insure that they are easily identified under casual conditions per NSTS 08080-1, Standard Number 99C, and shall be listed in the Control of Temporary Installations Log which is included in the requirements for the End Item Data Package (DRD 20).

C.1.3.3.7 Transportation

Capability shall be provided for shipment of hardware by truck and aircraft. The container or installed support equipment shall adequately protect the hardware from damage or degradation of performance due to the natural and induced environments encountered during transportation and subsequent storage.

C.1.3.3.7.1 Transportation of Equipment

The Contractor shall follow the specifications contained in NASA document NPG 6000.1G,

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C.1.3.3.7.2 Reusable Containers

NPG 6000.1G, contains requirements for reusable containers which are to be utilized for major component shipment. The Contractor may utilize standard off-the-shelf, low cost, metal or plastic containers where considered appropriate and cost effective to the program for shipment of subassemblies and components.

C.1.3.3.7.3 Monitoring Devices

SAE AS26860 humidity indicators shall be installed in the container walls or flexible barrier wall, of all Method 11 (desiccation) packages. Accelerometers shall be installed in shipping containers to record in-transit shocks.

C.1.3.3.7.4 Packaging Precision Clean Items

Prior to packaging, items cleaned to the required cleanliness level, shall first be prepackaged to assure maintenance of the prescribed cleanliness level throughout the shipping and storage environment.

C.1.4 2010 SOW Reductions – SRMS and IBA

C.1.4.1 Purpose

The purpose of this section is to describe the ramped reductions in requirements in 2010 due to the approaching end of the Shuttle program.

C.1.4.2 Scope

The Contractor shall not be required to perform the following activities in 2010:

- 1) Long range program planning
- 2) Update existing specialized support systems, databases, or tools
- 3) Establish new requirements for design or development
- 4) Update of system requirements, interface relationships (ICDs), test requirements, design documentation, Safety/Failure Modes and Effects Analysis/Critical Items List, Hazard reports, OMRSD, SODB, GPC Flight Software, and SSSH drawings.
- 5) Co-chair the Math Model Working Group
- 6) Refurbish flight hardware
- 7) Improve SRMS System Safety, Reliability and Performance
- 8) Upgrade ASAD or implement non-conformances
- 9) Support for Alerts after the last Shuttle launch (assumed to be November 30th, 2010)
- 10) Support for Hardware Investigation and Test Equipment Support (after all hardware is installed on the vehicle and checked out; assumed to be July 30th, 2010)
- 11) Support to the Shuttle Program, as required under this SOW, ends one week after the final Shuttle landing (assumed to be December 22nd, 2010)

C.1.5 Shuttle End of Program Closeout (IDIQ)

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C.1.5.1 Purpose

The purpose of this SOW is to describe the requirements for a safe and orderly completion and closeout of the SRMS program at the end of the Shuttle program.

C.1.5.2 Scope

The Contractor shall perform the activities as defined within this portion of the SOW for those activities required for a safe and orderly completion and closeout of the SRMS program.

C.1.5.3 End of Program Issues

The contractor shall establish and implement a comprehensive strategic and tactical retention plan to retain critical skills within the prime and critical subcontractors until the end of the Space Shuttle Program, maintain hardware, and safely complete the program objectives. The End of Program Plan (DRD 39) shall include all contributory elements to ensure human capital and hardware resources are maintained to safely and successfully execute the manifest through the end of the Space Shuttle Program. Critical skill quotas shall be maintained and reported quarterly in accordance with the Contractor Headcount Report (DRD 38).

The contractor shall perform activities required for the phased disposal, archival or other disposition of data and hardware at the completion of the SRMS program. This includes all data, records, hardware and software generated or collected from program formulation to completion of all flight activity, including completion of final termination activities. Hardware disposition should be in accordance with the monthly Property Management Plan (DRD 36).

Applicable Documents

The documents contained in this appendix form part of this SOW. It is noted that references in the body of the SOW to these documents are in places abbreviated. The abbreviations are to be interpreted as referring to the more complete description of the respective document which is listed in this section.

This appendix is divided into three distinct parts covering the following areas:

1. Documents Applicable to Shuttle and/or Station program work (documents that may be used by both Shuttle and Station Programs in the execution of sustaining engineering work, e.g. RMS, IBA, RWS, BCS).
2. Documents Applicable to Shuttle program work (documents which are only to be used on the Shuttle Programs)
3. Documents Applicable to Station program work (documents which are only to be used on the Station Programs)

The issues/revisions indicated on the applicable documents are the baselined documents to be applied to this contract. The exceptions are NSTS 22206, Requirements for the Preparation and Approval of FMEA and CIL, MF0004-400, Orbiter Projects Parts List, SSP 30312, SSP 30423, NASA Standard EEE Parts List, and all listed ICD's, for which the current NASA approved issues shall be used to establish requirements for the program. Documents identified with "(Reference)" next to the document number are intended for informational purposes only. It is recommended that current issues of the reference documents be maintained at the contractor's facility.

Not all documents listed in this section contain DRD or SOW paragraph references. They are included in this SOW either as top level NASA requirements imposed on the program or due to a direct relationship with the RMS program or hardware.

MDA and Spar documents listed in Appendix A or included in the scope of specific projects within the contract statement of work are considered to be baselined programmatic documents and require NASA approval of all proposed changes.

Other documents may be identified within specific Task Orders under this contract as being applicable to those specific projects.

APPLICABLE DOCUMENTS

DOCUMENT TITLE

REFERENCES

Documents Applicable to Shuttle and/or Station program work

NASA and JSC Documents

JPR 1700.1 (Reference)	JSC Safety and Total Health Handbook	DRD 10
JSC 09604 (Reference)	Material Selection List for Space Hardware Systems	DRD 24
JSC 17057 (Reference)	GFE Limited Cycle Time/Age Life Items Requirements	DRD 19
JSC 17773 (Reference)	Instruction for Preparation of Hazard Analyses for JSC Ground Operations	DRD 15
JSC 63051	Integrated System Requirements Document for the Inspection Boom Assembly (IBA) on the International Space Station (ISS)	
NASA-STD-5003	Fracture Control Requirements for Payloads using the Space Shuttle	DRD 27
<u>NASA-STD-6001</u> Feb 1998 (Reference)	Flammability, Odor, Offgassing, And Compatibility Requirements And Test Procedures For Materials In Environments That Support Combustion (Supersedes NHB 8060.1)	DRD 24
NASA-STD-7002	Payload Test Requirements	
NASA-STD-8739.1 Aug 1999	Workmanship Standard for Staking and Conformal Coating of Printed Wiring Boards and Electronic Assemblies	Para C.1.3.3.6.4
NASA-STD-8739.2 Aug 1999	Workmanship Standard for Surface Mount Technology	Para C.1.3.3.6.3
NASA-STD-8739.3 Dec 1997	Requirements for Soldered Electrical Connections	Para C.1.3.3.6.1
NASA-STD-8739.4 Feb 1998	Workmanship Standards for Crimping, Interconnecting Cables, Harnesses and Wiring	Para C.1.3.3.6.6
NASA-STD-8739.5 Feb 1998	Fiber Optic Terminations, Cable Assemblies, and Installation	Para C.1.3.3.6.7
NHB 1700.1 Vol. 2 (Reference)	Guidelines for Mishap Investigation	DRD 15
NPG 6000.1G	Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment and Associated Components.	Para C.1.3.3.7.1 Para C.1.3.3.7.2
NPG 9501.2C 23 April 1996	NASA Contractor Financial Management Reporting	DRD 06
NSTS 07700, Vol. V	Information Management Requirements	DRD 16, 35

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Dec 1996		
JSC 28035B December 18, 2006	Program Problem Reporting And Corrective Action Requirements For Johnson Space Center GFE	DRD 22
Note: This document incorporates provisions of NSTS 08126 and SSP 30223, Space Shuttle and Space Station, respectively, PRACA System Requirements. It has been tailored from these documents to support both programs and meet the obligations of the JSC corrective action system for timely reporting, determination of a root cause, and implementation and verification of corrective action(s) for problems occurring on JSC provided GFE.		
NSTS 22206 (Current Issue)	Requirements for Preparation and Approval of FMEA and CIL	DRD 14, 15, 35
S312-P-003	NASA Goddard Procurement Specification for Rigid Printed Boards for Space Applications and other High Reliability Uses	Para C.1.3.3.6.2
SE-R-0006D August 04, 1998	NASA JSC Requirements for Materials and Processes	Para C.1.3.3.3 DRD 24
SP-R-0022 (Reference)	General Specification for Vacuum Stability Requirement Polymeric Materials for Spacecraft Application	DRD 24
SSP 30234	Failure Modes and Effects Analysis and Critical Items List Requirements for Space Station	DRD 14
SSP 30312H (Reference) November 22, 1999	Electrical, Electronic, and Electromechanical (EEE) and Mechanical Parts Management and Implementation Plan for Space Station Program	DRD 34
SSP 30423 (Reference)	Space Station Approved Electrical, Electronic, and Electromechanical Parts List	DRD 34
NPR 8735.1	Procedures for Exchanging Parts, Materials, and Safety Problem Data Utilizing the Government-Industry Data Exchange Program (GIDEP) and NASA Advisories	DRD11
SC-L-0002 (Reference)	Lighting, Manned Spacecraft and Related Flight Crew Equipment, Functional Design Requirements	
SC-M-0003 (Reference)	Markings, Labeling, and Color, Manned Spacecraft and Related Flight Crew Equipment, Functional Design Requirements for Basic	
SD-D-0001 (Reference)	Metal Foil Decals, Manned Spacecraft and Related Flight Crew Equipment	
SL-E-0002 Dec1998	Specification, Electromagnetic Interface Characteristics, Requirements for Equipment	
SN-C-0005D July 20, 1998	Cleanliness and Contamination Control	

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SP-T-0023 (Reference)	Specification -- Environmental Acceptance Testing	
SW-E-0002F	Space Shuttle Ground Support Equipment general Design Requirements, New GSE	
JPG 2810.1	Johnson Space Center Information Technology Security Handbook	
NPR 2810.1	Security of Information Technology	
SO-999-L-JSC-0073 (SPMA0006)	Security Plan for the RMS Servers	
JSCA 01-060	Policy on Use of NASA Information Technology (IT) Resources	
JPD 2800.4	JSC IT Program Management	
JSC-26648	JSC Information Technology User's Security Guide	
JSC-05900	JSC Emergency Preparedness Plan	
NIST SP 800-60 vol. II	Guide for Mapping Types of Information and Information Systems to Security Categories	
PL 100-235	Computer Security Act of 1987	

MDA Program Documents

MR-MAN.001	Business Process System Manual	DRD 09
MR-PR.001	Management Review	DRD 09
MR-PR.007	Program Review Process	DRD 01, 03
MDA-R.1508	Software Standard and Development Process	
MDA-RMS-M.95433	Selection and Evaluation of EEE Parts for MDA Space Programs	
MDA-RMS-VDD.2784	Jeeves EIDP Report Engine	DRD 20
MDA-RMS-SG.2630	Software Requirements Specification For Jeeves EIDP Release	DRD 20
MDA-STD-M.7823	Integrated Logistics Support Requirements	DRD 28, 31
MDA-STD-M.7878	Workmanship Training	DRD 21
MDA-STD-M.7915 (s. 6.0)	Human Resource Department Manual	DRD 10
PE-PR.004	Design Reviews	DRD 13
PE-PR.005	Deviations and Waivers	DRD 15, 17, 26
PE-PR.006	Verification and Validation Process	DRD 32, 33
PE-PR.011 (Current Issue)	Test Readiness and Test Results Review Board	DRD 17
PE-PR.018	Non-Conformance Process Control	DRD 35
PE-PR.020	GIDEP / NASA ALERTS	DRD 11
PE-PR.024	Electrical, Electronic, and Electromechanical Parts Reliability Program	DRD 16, 21

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PE-PR.029	FMEA and CIL	DRD 14
PE-PR.030	Hazard Analysis and Reports	DRD 16
PE-PR.031	Part Screening and DPA Requirements	DRD 24, 34
PE-PR.033	Software Enhancement	DRD 29
PE-PR.034	Materials and Process Requirements	DRD 19, 24, 27
PE-PR.038	Mechanical Parts Reliability Program	DRD 24
PE-PR.039	Identification and Traceability	
PE-PR.040	Software Product Assurance Activities	Para C.1.3.3.5.3 DRD 21
PE-PR.047	Product Assurance Requirements	Para C.1.1.3.3.1 Para C.1.3.3.5.3 DRD 16, 19, 23, 26, 25, 28, 31, 32, 33, 34, 36 DRD 30
PE-PR.057	Software Verification and Validation Process	DRD 30
PE-PR.059	Off-The-Shelf (OTS) Methodology Overview	DRD 21, 34
PE-PR.064	Electrostatic Discharge (ESD) Control Program	
PE-PR.067	Requirements of Environmentally Controlled Areas	
PE-PR.069	Field Programmable Gate Arrays (FPGA) using VDHL	
PE-PR.071	Service/Overhaul and Repair	Para C 1.2
PE-PR.073	Software Development Process	DRD 29
PE-PR.77	Evaluation and Control of Pure Tin	
PE-WI.007	Preparation of Non-standard Part Approval Request – Mechanical / EEE	DRD 25
PE-WI.009	Preparation of Parts Application Analyses	
PE-WI.010	Preparation of EEE Part Procurement Specifications	DRD 34
PE-WI.023	Design Review Scope and Preparation	DRD 13
PE-WI.029	Structural Analysis and Verification	DRD 32, 33
PE-WI.063	Guide to Typical Materials and Processes Drawing Notes	DRD 24
PE-WI.064	Mechanical Standard Parts List for Space Systems	DRD 24
PE-WI.078	Software Safety Analysis	DRD 30
PE-WI.096	Methodology For the Evaluation of Off The Shelf Hardware	DRD 11, 19, 21, 34
PE-WI.102	Approved Electrical, Electronic and Electromechanical(EEE) Parts Suppliers	DRD 34
PM-PR.003	Project Schedule Management Process	DRD 04
DM-PR.002	Software Configuration Management Process	DRD 23

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DM-PR.010	Product Assurance Records	DRD 18
DM-PR.011	Preparation and Review of Deliverable Data	DRD 18, 20
DM-PR.020	Configuration and Data Management (CADM)	DRD 08
DM-WI.015	Jeeves – Creating an Engineering Change Notice (ECN)	DRD 23
DM-WI.020	Jeeves – Create a Change Control Document	DRD 23
DM-WI.037	Approval and Release of Deviations and Waivers	DRD 15, 26
DM-WI.047	Document/Drawing/ECN – Release, Updates and Distribution	DRD 23
MDA-RMS-PA.2533	OTS Methodology	C.1.3.3 C.1.3.3.6.2 C.1.3.3.6.8 DRD 25, 34

American and Federal Standards

ANSI/ESD S20.20-1999	ESD Association Standard for the Development of an Electrostatic Discharge Control Program for – Protection of Electrical and Electronic Parts, Assemblies and Equipment	Para C 1.3.3.6.10
ASME Y14.100	Engineering Drawing Practices	
DOT/FAA/AR-MMPDS-02 (Reference)	Metallic Materials Properties Development and Standardization	DRD 24
SAE AS26860	Indicator, Humidity, Plug and Color Change	Para C 1.3.3.7.3
SAE AS9100	Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing	C.1.1.3.3.1 C.1.3.3.5.1 DRD 09

Military Specifications and Standards

MIL-STD-3010A	Test Procedures for Packaging Materials	
MIL-STD-810	Environmental Engineering Considerations and Laboratory Tests	
MIL-STD-882D Feb 2000	DOD Standard Practice for System Safety	DRD 15

Military and DOD Handbooks

DOD H4-1 (Reference)	Federal Supply Code of Manufacturers Name and Code	
MIL-HDBK-6870A 28Aug01	Inspection Program Requirements Nondestructive For Aircraft And Missile Materials And Parts	Para C.1.3.3.6.9
MIL-HDBK-129	Military Marking for Shipment and Storage	

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(Reference)		
MIL-HDBK-17B (Reference)	Composite Materials Handbook	
MIL-HDBK-1812 Current Issue	Type Designation, Assignment And Method For Obtaining	
MIL-HDBK-881A	Work Breakdown Structures for Defense Material Items	

Institute for Interconnecting and Packaging Electronic Circuits

IPC/EIA J-STD-001	Joint Industry Standard Requirements for Soldered Electrical and Electronic Assemblies	Para C.1.3.3.6.8
IPC-A-600	Acceptability of Printed Boards	Para C.1.3.3.6.2
IPC-A-610	Acceptability of Electronic Assemblies	Para C.1.3.3.6.8
IPC-2221	Generic Standard on Printed Board Design	Para C.1.3.3.6.2
IPC-2222	Sectional Standard on Rigid Organic Printed Boards	Para C.1.3.3.6.2
IPC-2223	Sectional Design Standard for Flexible Printed Boards	Para C.1.3.3.6.2
IPC-2224	Sectional Standard of Design of PWB and PC Cards	Para C.1.3.3.6.2
IPC-6011	Generic Performance Specification for Printed Boards	Para C.1.3.3.6.2
IPC-6012	Qualification and Performance Specification for Rigid Printed Boards	Para C.1.3.3.6.2
IPC-6013	Qualification and Performance Specification for Flexible Printed Boards	Para C.1.3.3.6.2

Documents Applicable to Shuttle program work

NASA and JSC Documents

NSTS 07636 (Reference)	Space Shuttle Lightning Protection, Test and Analysis Requirements	
JSC 07700-10 MVP-01 (Reference)	Shuttle System Master Verification Plan General Approach and Guidelines, Vol. 1	
JSC 17481 Issue A	Safety Requirements Document for JSC Space Shuttle Flight Equipment	Para C.1.3.3.5.6 DRD 15, 16, 35
JSC 26626A	Extravehicular Activity (EVA) Hardware Generic Design Requirements Document	
MJ070-0001-1	Orbiter Vehicle End Item (OVEI) Specification for the Space Shuttle System	

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NSTS 08080-1 30 June 1992	Space Shuttle Manned Spacecraft Criteria and Standards (See Applicability Matrix following document list)	Para C.1.3.3.4 Para C.1.3.3.6.11 DRD 10,15
NSTS 5300.4 (1D-2) Sept 1997	Safety, Reliability, Maintainability, and Quality Provisions for the Space Shuttle Program	Para C.1.1.3.3.1 Para C.1.3.3.5.4 DRD 09, 15, 16, 19, 22, 34
NSTS 07700, Vol. X	Flight and Ground System Specification Nov 1998	
NSTS 07700, Vol. XI	System Integrity Assurance Program Plan May 1993	
NSTS 07700, Vol. XII 2002, Rev. J	Integrated Logistics Requirements	
NSTS 07700 Vol. XIV 2000	System Payload Accommodations	
NSTS 22254 (Current Issue)	Methodology for Conduct of Space Shuttle Program Hazard Analysis	DRD 15, 16, 35
NSTS 37330	Bonding, Electrical and Lightning Specifications	
NSTS 60514	System Requirements Document for the Orbiter Boom Sensor System Baseline	
SL-E-0001 July 2001 TM 102179	Electromagnetic Compatibility Requirement Systems for the Space Shuttle Program Selection of Wire and Circuit Protective Devices for STS Orbiter Vehicle Payload Electrical Circuits	

Interface Control Documents -- Current Issue

ICD-2-19001	Shuttle Orbiter / Cargo Standard Interface	
ICD-3-0014-01	Integrated AFT Flight Deck	
ICD-3-0018-01	Manipulator Arm / Orbiter Physical Interface	
ICD-3-0018-02	Manipulator Arm / Orbiter Electrical Interface	
ICD-3-0018-03	RMS D&C / Orbiter Interface	
ICD-3-0018-04	Manipulator Controller Interface Unit / Orbiter Interface	
ICD-3-0018-06	Manipulator Arm / Orbiter Thermal Interface	
ICD-3-0018-07	Remote Manipulator System / GSE Interface	
ICD-3-0018-08	Orbiter boom Sensor System (OBSS) Interface Control Document	
NSTS-21000-IDD-ISS	International Space Station Interface Definition Document	

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SPAR-RMS-ICD-017	RMS Mechanical Assembly / RMS CCTV and Lighting Subassembly Interface	
SPAR-RMS-ICD-018	RMS Mechanical Arm / End Effector Interface	

MDA Program Documents

MDA-RMS-ITP.7679	EVA Sharp Corners Inspection Test Procedure	
MDA-RMS-TM.7203	SRMS and IBA Fair Wear and Tear Specification	
SPAR-QAS.003 (Current Issue)	Remote Manipulator System (RMS) Division Subcontractor Quality Assurance Requirements Specifications	
SPAR-SS-SG-1008	MSS Program Phase D1 Subcontractor Product Assurance Requirements, section 5 Software Product Assurance and table 1.3 SPA Requirement Tailoring Rules.	
SPAR-RMS-PA.005	SRMS Control Of Life Limited Items Program Directive	DRD 19
SPAR-RMS-PA.009	SRMS Contamination/Cleanliness Control Requirements	
SPAR-RMS-PA.032	SRMS Waivers/Deviations	DRD 26
SPAR-RMS-PA.1067	FMEA And CIL SRMS	DRD 14, 15
SPAR-RMS-PA.1068	SRMS System Hazard Analysis	DRD 15
SPAR-RMS-PP.012	SRMS Reliability, Safety, and Maintainability Program Plan	DRD 31
SPAR-RMS-PP.031	SRMS Verification Plan	DRD 23
SPAR-RMS-PP.034	SRMS System Safety Plan	DRD 15
SPAR-RMS-PP.036	SRMS Certification Plan	DRD 32
SPAR-RMS-PP.041	SRMS Contamination/Cleanliness Control Plan	
SPAR-RMS-R.085	SRMS System Safety Analysis Report	DRD 16
SPAR-RMS-R.116	RMS Limited Life List	DRD 19
SPAR-RMS-SG.139	SRMS FOP Performance Specification	DRD 33
SPAR-RMS-TP.168	Flight Model System Integration and Test Plan	DRD 32
SPAR-RMS-SG.366	Performance Specification, Manipulator Arm, Shuttle SRMS	

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SPAR-SG. 368	SRMS Material and Process Requirements	
SPAR-SG.369	SRMS Preferred Materials and Processes List	
SPAR-SG.377	Shuttle Remote Manipulator System Electrical Subsystem Specification	
SPAR-SG.378	Specification for the Display and Control Subsystem of the Space Shuttle Remote Manipulator System	
SPAR-SG.379	Configuration Management Plan, SRMS	DRD 12, 23, 26
SPAR-SG.392	SRMS Contract End Item Specification	DRD 33
SPAR-SG.524	Ground Support Equipment Design Requirements, SRMS	
SPAR-R.776	SRMS Design Definition Report	DRD 33
SPAR-RMS-PA.1067	SRMS Failure Mode and Effects Analysis and Critical Items List	DRD 14, 15
SPAR-RMS-PA.1068	Hazard Analysis SRMS	DRD 16
SPAR-RMS-R.135	SRMS Life Certification Summary Report	DRD 19
SPAR-TM.1412	SRMS Fracture Control Plan	DRD 27

Boeing

MF0004-002	Electrical Design Requirements for Electrical Equipment Utilized on the Space Shuttle Vehicle	
MF0004-014	Environmental requirements and Test Criteria for the Orbiter Vehicle	
MF0004-400 (Current Issue) (Reference)	Orbiter Projects Parts List (OPPL)	
STS 87-0017 (Current Issue) (Reference)	Space Shuttle Orbiter Operational Level C, Functional Subsystem Software Requirements, Remote Manipulator System (RMS)	

Documents Applicable to Station program work

MDA Program Documents

MDA-BCS-SG-5822	Specifications for the Berthing Cues System (BCS) Avionics Package	
MDA-RWS-PR.7148	Packaging and Shipping Procedure, RWS	
NASA and JSC Documents JSC 29684	NASA/JSC/CAS/MCAS Integrated Berthing System Report	
KHB 1700	Space Shuttle Payload Ground Safety Handbook	
SSP 30233	Space Station Requirements for Materials and	DRD 24

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	Processes	
SSP 30237	Space Station Electromagnetic Emission and Susceptibility Requirements	
SSP 30238	Space Station Electromagnetic Techniques.	
SSP 30240	Space Station Grounding Requirements	
SSP 30242	Space Station Cable and Wiring Design Requirements	
SSP 30443	Space Station Requirements for Electromagnetic Compatibility	DRD 35
SSP 30245	Space Station Bonding Requirements	
SSP 30256	Extravehicular Activity (EVA) Standard Interface Control Document	
SSP 30309	Safety Analysis and Risk Assessment Requirements Document	DRD 16, 35
SSP 30420	Space Station Electromagnetic, Ionizing Radiation and Plasma Environment Definition and Design Requirements	
SSP 30425	Space Station Program Natural Environment Definition for Design	
SSP 30426	Space Station External Contamination Control Requirements	
SSP 30512	Space Station Ionizing Radiation Design Environment	
SSP 30558	Fracture Control Requirements for Space Station	DRD 24, 27
SSP 30559	Structural Design and Verification Requirements	
SSP 30599	Safety Review Process	DRD 16, 35
SSP 30695	Acceptance Data Package Requirements Specification	DRD 18, 32 & 33
SSP 41000	Systems Specification for the International Space Station	
SSP 41167	Mobile Servicing System Segment Specification for the International Space Station Program	
SSP 41170	Configuration Management Requirements	
SSP 41171	Preparation of Program-Unique Specifications	
SSP 41172	Qualification and Acceptance Environmental Test Requirements	
SSP 41173	Space Station Quality Assurance Requirements	
SSP 42003	Space Station Manned Base to Mobile Servicing System Interface Control Document	
SSP 42004	Mobile Servicing System to User (Generic) Interface Control Document	
SSP 50004	Ground Support Equipment Design	

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	Requirements	
SSP 50005	International Space Station Flight Crew Integration Standard	
SSP 50021	Safety Review Process	DRD 35
SSP 50287	Hardware/Software Acceptance Process and Requirements	
SSP 50098	Robotic Workstation to Space Station Manned Base (SSMB) Interface Control Document	
SSP 50123	Configuration Management Handbook	
SSP 50486	Pre-Flight Imagery Requirements for NASA Provided ISS Government Furnished Equipment	
SSP 55000	Prime Item Development Specification for Robotic Workstation (RWS)	
SSP 57003	Attach Payload Interface Requirements Document	
SSP 57004	Attached Payload Hardware Interface Control Document Template	
JSC-28763	Project Technical Requirements Specification for the Centerline Berthing Camera System	
JSC-28918	EVA Design. Requirements and Considerations	

Military and DOD Handbooks

MAPTIS	Materials Selection List for Space Hardware Systems	DRD 24
MIL-DTL-31000C	Technical Data Packages	
ASTM SI 10	American National Standard for Use of the International System of units (SI)	

NSTS 08080-1 STANDARD APPLICABILITY MATRIX

Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
1A	Equipment Accessibility for Maintenance	Applicable	(See 136)
2A	Equipment Containers – Design for Rapid Spacecraft Decompression	Applicable	
3A	Mating Provisions for Electrical Connectors	Applicable	
4B	Separation of Redundant Equipment	Applicable	(See 20A) Waived for RMS, P/N 51140F1-5, s/n 201 up (W0548, PRCBD S76270B)
5	Transistors - Selection of Types	Applicable	
6A	Protection of Severed Electrical Circuits	Not Applicable	RMS is not jettisoned under normal operations.

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
7	Systems Checkout Provisions	Applicable	
8A	Alignment of Mechanical Systems	Applicable	
9	Protection of Spacecraft Electrical and Mechanical Systems From Debris	Applicable	Waived for RMS end effector, P/N 51140F36-5, s/n 201 up (W0546, PRCBD S76270B)
10	Interior Design of Spacecraft for Cleanliness	Applicable	
11A	Time Displays	Applicable	(see 58)
12A	Redundancy Requirements	Applicable	Waived for RMS, P/N 51140F1-5, s/n 201 up (W0547, PRCBD S76270B)
13	Electrical and Electronic Devices - Protection from Reverse Polarity and/or Other Improper Electrical Inputs	Applicable	
14A	Material Selection, Review, and Drawing Sign-Off	Applicable	
15	Cancelled		
16	Gyroscopes - Verification of Rotational Speed or Drift Rate	Not Applicable	RMS contains no gyroscopes.
17	Flow Restriction Requirements - Pressurized Sources	Not Applicable	No pressurized gas lines are used in the RMS.
18	Spacecraft Material – Restriction on Use of Polyvinyl Chloride	Applicable	
19	Electrical and Electronic Piece Parts- Closure Construction	Applicable	
20A	Redundant Electrical Circuits	Applicable	(see 4B)
21A	Meteoroid Protection Levels for Structures	Applicable	
22A	Flammability of Wiring Material	Applicable	
23	Toxicity of Materials Used in Crew Compartments - Wire Insulation, Ties, Identification' Marks, and Protective Covering	Applicable	
24	Moisture Separators in a Zero-Gravity Environment	Not Applicable	No water separators are used in the RMS.
25	Wire Bundles - Protective Coating	Applicable	
26	Titanium or Its Alloys – Prohibited Use With Oxygen	Applicable	
27	Onboard Experiments – Required Pre-installation Checklist	Applicable	
28	Intermittent Malfunctions - Prohibited Use of Equipment	Applicable	(see 100)

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
29	Stainless Steel Tubing – Method of Joining	Applicable	
30	Service Points - Positive Protection From Inter-Changeability of Fluid Service Lines	Not Applicable	There are no fluid systems in the RMS.
31	Electrical Connectors – Moisture Protection	Applicable	(See 80) Waived for RMS MAA, P/N 51140J1565, s/n 201 (W0536, PRCBD S76270A).
32	Electrical Connectors – Pin Assignment	Applicable	
33	Toxicity – Materials Used in Habitable Areas	Applicable	(see 89)
34	Toxicity - Fluids Contained in Systems in the Crew Compartment	Not Applicable	There are no fluid systems in the RMS.
35	Ground Service Points – Fluid Systems	Not Applicable	There are no fluid systems in the RMS.
36	Redundant Paths – Verification of Operation	Applicable	Waived for RMS, P/N 51140F1-5, s/n 201 up (W0549, PRCBD S76270B)
37	Corona Suppression	Applicable	
38A	Fluid Systems - Design for Flushing and Draining	Not Applicable	There are no fluid systems in the RMS.
39A	Explosive Devices – Arming and Disarming	Not Applicable	RMS contains no explosive devices.
40	Cancelled		
41A	Shatterable Material – Exclusion From Habitable Compartment	Applicable	
42	Fluid Lines - Separation Provisions	Not Applicable	There are no fluid systems in the RMS.
43	Restriction on Coatings for Areas Subject to Abrasion	Applicable	
44	Temperature and Pressure Monitoring Requirements of Hydrogen Peroxide Systems	Not Applicable	No hydrogen peroxide is used in the RMS or the RMS GSE.
45	Electrical Integrity of Recovery Equipment After Water Landing	Not Applicable	
46	Protection of Electrical Circuitry for Explosive Devices Employing Hot Bridgewire Initiators	Not Applicable	RMS contains no explosive devices.
47	Capping of Servicing and Test Ports	Not Applicable	There are no fluid systems in the RMS.
48	Circuitry for Automatic Shutdown of Launch Vehicle Engine(s)	Not Applicable	RMS is not part of launch vehicle engine system.

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
49	Fluid System Components Whose Function Is Dependent on Direction of Flow - Protection Against Incorrect Installation	Not Applicable	There are no fluid systems in the RMS.
50A	Spacecraft Venting-Induced Perturbing Forces	Not Applicable	RMS contains no spacecraft venting capability.
51	Beryllium - Restricted Use Within Crew Compartment(s)	Applicable	
52	Tantalum Wet Slug Capacitors - Restriction on Use	Applicable	
53	Sealing - Solid Propellant Rocket Motors	Not Applicable	RMS contains no solid propellant rocket motors.
54	Reentry Propulsion Subsystem In-Flight Test	Not Applicable	RMS is not part of spacecraft reentry propulsion subsystem.
55	Solar Wind Environment	Not Applicable	RMS is not intended for operation outside the magnetosphere.
56	Crew Compartment Controls Requiring Tool(s) for Actuation – Position	Applicable	(see 65)
57A	Attitude Control Authority	Not Applicable	RMS is not part of spacecraft automatic control subsystem.
58	Crew Station Time Measurement Indicators	Applicable	(see 11A)
59	Switch Protection Devices	Applicable	
60	Spacecraft Recovery Hoist Loops	Not Applicable	RMS is not a recoverable spacecraft.
61	Hatches - Repeated Use	Not Applicable	RMS contains no hatches.
62	Threaded Fittings – Restrictions on Release of Particles and Foreign Material	Applicable	
63	Metals and Metal Couples - Restriction on Use	Applicable	
64	Nozzles and Vents – Protection Prior to Launch	Not Applicable	RMS contains no nozzles or vents.
65	Detachable Crew-Operated Tools – Restriction in Spacecraft	Applicable	(see 56)
66	Solid Propellant Rocket Motors - Ignition Capability With Unsealed Nozzle	Not Applicable	RMS contains no solid propellant rocket motors.
67	Fluid Supplies - Verification Tests	Not Applicable	There are no fluid systems in the RMS.

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
68	Electrical and Electronic Supplies and Loads - Verification Tests	Applicable	
69	Electrical Circuits -- De-energizing Requirement	Applicable	
70	Solutions Which Contain Ethylene Glycol - Requirements for Silver Chelating Agent	Not Applicable	RMS contains no ethylene glycol.
71	Protection of Pressurized Systems From Damage Due to Pressurant Depletion - Ground Support Equipment	Not Applicable	There are no fluid systems in the RMS.
72	Crew Cabin Module Pressure - Venting Restriction	Not Applicable	RMS contains no spacecraft venting capability.
73	Crew Cabin Module Ventilating Fans - Protection From Debris	Not Applicable	RMS contains no spacecraft ventilation capability.
74	Separation of Hypergolic Reactants	Not Applicable	RMS contains no hypergolic reactants.
75	Measurement Systems That Display Flight Information to the Crew - Indication of Failure	Applicable	
76	Fluid Line Installation	Not Applicable	There are no fluid systems in the RMS.
77	Control of Limited Life Components	Applicable	
78	Cleanliness of Flowing Fluids and Associated Systems	Not Applicable	There are no gas or fluid systems in the RMS.
79	Procurement Document Identification for Manned Spaceflight Vehicle Items	Applicable	
80	Protection of Electrical/Electronic Assemblies from Moisture Damage	Applicable	(see 31)
81	Cleaning of Electrical and Electronic Equipment	Applicable	
82	Brazed Joints - Identification Marks	Not Applicable	RMS contains no fuel or oxidizer lines.
83	Application of Previous Qualification Tests	Applicable	
84A	Shipping and Handling Protection for Spaceflight Hardware	Applicable	
85A	Protective Covers or Caps for Electrical Receptacles and Plugs	Applicable	
86	Direct Procurement of Parts	Applicable	
87A	Radiographic Inspection of Brazed and Welded Tubing Joints	Not Applicable	RMS contains no tubing.
88A	Wire Splicing	Applicable	

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
89	Toxicity – Requirements for Nonmetallic Materials Proposed for Use Within Crew Compartment	Applicable	(see 33)
90B	Explosive Devices – Packaging Material	Not Applicable	RMS contains no explosive devices.
91	Liquid or Gas Containers - Verification of Contents	Not Applicable	There are no gas or fluid systems in the RMS.
92	Pressure Relief Valves - Standardization of Functional Testing	Not Applicable	RMS contains no pressure relief valves.
93	Protection for Tubing, Fittings, and Fluid System Components – Flight Hardware and Associated Equipment	Not Applicable	There are no fluid systems in the RMS.
94	Fluid Systems Cleanliness – Verification in Draining, Purging, and Flushing Operations	Not Applicable	(see 97) There are no fluid systems in the RMS.
95E	Electrical Wire and Cable Acceptance Tests	Applicable	GSI requirement waived for RMS MAA, P/N 51140J1668- 1, s/n 201 (W0594, PRCBD S76270A).
96A	Explosive Devices – Identification Requirements	Not Applicable	RMS contains no explosive devices.
97	Fluid System – Flushing Requirements	Not Applicable	(see 94) There are no fluid systems in the RMS.
98	Wire Insulation, Potting Preparation - Etching	Applicable	(see 109B)
99C	Identification and Classification of Flight and Non-flight Equipment	Applicable	
100	Equipment Failure-Verification of Flight Readiness	Applicable	(see 28)
101	Material Detrimental to Electrical Connectors	Applicable	
102	Operating Limits on Temperature-Controlled Equipment	Applicable	
103A	Explosive Devices – Color Coding Requirements	Not Applicable	RMS contains no explosive devices.
104	Flight Hardware - Restriction on Use for Training	Applicable	
105B	Pyrotechnic Devices – Preflight Verification Tests at Launch Sites	Not Applicable	There are no pyrotechnic devices in the RMS.
106	Cancelled		
107	Separate Stock for Spaceflight Parts and Materials	Applicable	
108A	Reuse of Flight Hardware	Applicable	

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
109A	Etching Fluorocarbon Insulated Electrical Wire	Applicable	(see 98) Waived for RMS SPEE, P/N 51140F36-3 and -5, s/n 201 and 202 (W0568, PRCBD S76270A).
110B	Structural Analysis	Applicable	
111	Leak Detectors - Wetting Agents	Not Applicable	No wetting agents are used in the RMS.
112	Electrical Connectors - Disconnection for Trouble-Shooting and Bench Testing	Applicable	
113	Cancelled		
114A	Pressure Vessels – Materials Compatibility and Vessel Qualification Tests	Not Applicable	No pressure vessels are used in the RMS.
115	Safety Precautions - Test and Operating Procedures	Applicable	
116	Mercury – Restriction on Use	Applicable	
117	Fluid Systems –Review of Cleaning, Flushing, and Purging Procedures	Not Applicable	There are no fluid systems in the RMS
118	Purge Gases - Temperature and Humidity Requirements	Not Applicable	The RMS uses no purge gases.
119	Special Processes - Identification of Drawings	Applicable	
120A	Breathing Systems - Requirement to Test for Mercury Contamination	Not Applicable	There are no breathing systems in the RMS.
121	Spacecraft Equipment – Protection From System Liquids	Applicable	
122	Spacecraft Equipment – Moisture Protection	Applicable	Waived for RMS MCIU, P/N 51140F160, s/n 201 up, (W0552, PRCBD S76270B)
123	Pressure Garments – Protection Against Failure Propagation	Not Applicable	RMS equipment does not supply pressure to crewmen's pressure garments.
124	Separation Sensing System - Structural Deformation	Not Applicable	RMS contains no separation capability.
125	Cadmium – Restriction on Use	Applicable	
126	Verification of Adequate External Visibility	Applicable	
127	Pressurization or Re-pressurization - Precluding Ingress of Undesirable Elements	Not Applicable	RMS contains no habitable area pressurization or ventilation capability.
128	Electrical Connectors – Shorting Springs or Clips	Applicable	
129	Parts Identification	Applicable	

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
130	Pressure Garment Wiring – Ignition of Materials by Electrical Current	Not Applicable	RMS contains no pressure garments.
131	Bioinstrumentation Systems – Crew Electrical Shock Protection	Not Applicable	RMS contains no Bioinstrumentation systems.
132	Pressure Vessels – Negative Pressure Damage	Not Applicable	No pressure vessels are used in the RMS.
133D	Electrical Wire Harnesses - Dielectric Tests	Applicable	
134	Electrical Power Distribution Circuits - Overload Protection	Applicable	Waived for RMS MAA, P/N 51140F5-3 and -5 (W0543, PRCBD S76270A).
135	Repair of Sandwich-Type Structures	Applicable	
136	Panel Mounted Displays and Controls – Maintainability	Applicable	See 1A
137	Pressure Vessels – Nondestructive Evaluation Plan	Not Applicable	No pressure vessels are used in the RMS.
138	Lightning Protection Design	Applicable	
139	Pressure Vessel Design	Not Applicable	No pressure vessels are used in the RMS.
140	Pressure Vessel Documentation	Not Applicable	No pressure vessels are used in the RMS.
141A	Radioactive Luminescent Devices	Applicable	
142	Exposed Sharp Surfaces or Protrusions	Applicable	
143	Atmospheric Pressure and Composition Control	Not Applicable	There are no breathing systems in the RMS.
144	Windows and Glass Structure	Not Applicable	RMS contains no stress carrying glass.
145	Acoustic Noise Criteria	Applicable	
146	Equipment Design – Power Transients	Applicable	Compatible emissions Requirement is waived for RMS SPA's P/N 2571249-5501 (W0535), RMS MAA P/N 51140J1668-1, s/n 201 (W0537 and W0539), and RMS MCIU, P/N 2571212- 5501, s/n 202 (W0538) (PRCBD S76270A).
147A	Qualification Fluid	Not Applicable	There are no fluid systems in the RMS.
148	Testing Protective Devices for Solid State Circuits	Applicable	Waived for all RMS Subsystems, P/N 51140F1-5 (W0550, PRCBD S76270B).
149	Pressure Relief for Pressure Vessels	Not Applicable	No pressure vessels are used in the RMS.

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Standard + Rev	TITLE	Applicability	Remarks/Supporting Rationale
150	Functional Doors That Operate in Flight	Not Applicable	RMS contains no spacecraft doors.
151	Penetration of Inhabited Spacecraft Compartments	Not Applicable	RMS is not a part of spacecraft pressurized compartment Structure.
152B	Liquid Locking Compounds - Restrictions and Controls	Applicable	
153	Ground Support Equipment and Airborne Support Equipment Protective Devices	Applicable	
154	Internally Generated Radiation	Not Applicable	RMS does not internally generate radiation.

List of Acronyms

ADP	Acceptance Data Package
ALERT	Acute Launch Emergency Reliability Tips
ATP	Acceptance Test Procedure
BCS	Berthing Camera System
BDA	Backup Drive Amplifier
CADM	Configuration And Data Management
CAGE	Commercial And Government Entity
CARR	Customer's Acceptance Readiness Review
CCTV	Closed Circuit Television
CDP	Certification Data Package
CDR	Critical Design Review
CEI	Contract End Item
CIL	Critical Items List
COTR	Contract Offices Technical Representative
COTS	Commercial Off The Shelf
CP	Certification Plan
CR	Change Request
CSP	Change of Scope Proposal
CSR	Certification Status Report
D&C	Displays and Controls
DDT&E	Design, Development, Test, and Evaluation
DOD	Department Of Defense
DR	Discrepancy Report
DRD	Data Requirements Description
DRL	Data Requirements List
ECN	Engineering Change Notice
EEE	Electrical, Electronic, and Electromechanical
EEEU	End Effector Electronics Unit
EFGF	Electrical Flight Grapple Fixture
EGSE	Electrical Ground Support Equipment
EIDP	End Item Data Pack
EM	Electro Magnetic
ESD	Electrostatic Discharge (ESD) Control
EVA	Extravehicular Activity
FACI	First Article Configuration Inspection
FIAR	Failure Investigation Action Report
FMEA	Failure Modes and Effects Analysis
FOP	Follow On Production
FRGF	Flight Releasable Grapple Fixture
FRR	Flight Readiness Review
GBL	Government Bill of Lading
GFE	Government Furnished Equipment
GIDEP	Government Industry Data Exchange Program

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GSE	Ground Support Equipment
GSI	Government Source Inspection
HOEE	Hand Operated End Effector
ICD	Interface Control Document
ILS	Integrated Logistics Support
IPAR	Irregular Part Approval Request
IPC	Institute for Interconnecting and Packaging Electronic Circuits
ISSP	International Space Station Program
IT	Informaton Technology
JSC	Johnson Space Center
JSCM	JSC Manual
KSC	Kennedy Space Center
LRU	Line Replaceable Unit
M & P	Material and Processes
MCIU	Manipulator Controller Interface Unit
MDA	MacDonald, Dettwiler and Associates Inc.
MDA	MacDonald Dettwiler & Associates, Inc.
MM	Motor Module
MRB	Materials Review Board
MSS	Mobile Servicing System
MUA	Material Usage Agreement
NASA	National Aeronautics and Space Administration
NCR	Non-Conformance Report
NDI	Numerical Drawing Index
NHB	NASA Hand Book
NSPAR	Non-Standard Part Approval Request
NSTS	National Space Transportation System
OPPL	Orbiter Projects Parts List
OTS	Off-The-Shelf
PA	Product Assurance
PAA	Part Application Analysis
PC	Personal Computer
PCD	Product Configuration Definition
PDGF	Power and Data Grapple Fixture
PDR	Preliminary Design Review
PI	Program Infrastructure
P/N	Part Number
PPL	Parts Provisioning List
PRACA	Problem Reporting and Corrective Action
PWB	Printed Wire Board
QA	Quality Assurance
QC	Quality Control
QMS	Quality Management System
QS	Quality System
QSA	Qualification Site Approval

Section C

QTRR	Qualification Test Readiness Review
RAESR	Risk Assessment Executive Summary Report
RID	Review Item Disposition
RMS	Remote Manipulator System
RWS	Robotic Work Station
R&O	Repair and Overhaul
SAIL	Shuttle Avionics Integration Laboratory
SAR	Safety Analysis Report
SCD	Specification Control Document;/ Source Control Drawing
SCM	Software Configuration Management
SCN	Specification Change Notice
SCU	Signal Conditioning Unit
SFDS	System Functional Design Specification
SIAP	System Integrity Assurance Program
S/N	Serial Number
SOW	Statement of Work
SPA	Servo Power Amplifier
SPPE	Special Purpose End Effector
SRMS	Shuttle Remote Manipulator System
SRMSCAR	SRMS (Board) Certification Approval Request
SR&QA	Safety, Reliability, and Quality Assurance
SRU	Shop Replaceable Unit
S/W	Software
VSC	Video Signal Controller
WBS	Work Breakdown Structure

Section D - Packaging and Marking

D.1 Listing of Clauses Incorporated by Reference

The following contract clauses pertinent to this section are hereby incorporated by reference:

I. Federal Acquisition Regulation (48 CFR Chapter 1)

Clause

<u>Number</u>	<u>Date</u>	<u>Title</u>
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No FAR By Reference clauses in Section D.

II. NASA FAR Supplement (48 CFR Chapter 18) Clauses

Clause

<u>Number</u>	<u>Date</u>	<u>Title</u>
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1852.211-70	Sep 2005	Packaging, Handling, and Transportation
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(End of Clause)

[End of Section]

Section E - Inspection and Acceptance

E.1 Listing of Clauses Incorporated by Reference

The following contract clauses pertinent to this section are hereby incorporated by reference:

I. Federal Acquisition Regulation (48 CFR Chapter 1) Clauses

<u>Clause Number</u>	<u>Date</u>	<u>Title</u>
52.246-2	Aug 1996	Inspection of Supplies -- Fixed-Price
52.246-3	May 2001	Inspection of Supplies—Cost-Reimbursement
52.246-4	Aug 1996	Inspection of Services -- Fixed-Price
52.246-5	Apr 1984	Inspection of Services – Cost Reimbursement
52.246-7	Aug 1996	Inspection of Research and Development -- Fixed-Price
52.246-8	May 2001	Inspection of Research and Development – Cost Reimbursable (Alt 1)(Apr 1984)
52.246-16	Apr 1984	Responsibilities for Supplies

II. NASA FAR Supplement (48 CFR Chapter 18) Clauses

<u>Clause Number</u>	<u>Date</u>	<u>Title</u>
No NASA By reference clauses in Section E.		

(End of Clause)

E.2 Higher-Level Contract Quality Requirement (FAR 52.246-11)(Feb 1999)

The Contractor shall comply with the higher-level quality standard selected below.

<u>Title</u>	<u>Number</u>	<u>Date</u>	<u>Tailoring</u>
Quality Management Systems – Aerospace Requirements	SAE AS9100	2004	N/A

(End of Clause)

E.3 Government Contract Quality Assurance Functions (NFS 1852.246-71)

(Oct 1988)

In accordance with the inspection clause of this contract, the Government intends to perform the following functions at the locations indicated:

Item	Quality Assurance Function	Location
Flight Hardware and Ground Support Equipment that interfaces with Flight Hardware	Inspection, testing, and acceptance	Place of manufacture, assembly, processing, or test

(End of Clause)

E.4 Material Inspection and Receiving Report (NFS 1852.246-72)(Aug 2003)

(a) At the time of each delivery to the Government under this contract, the Contractor shall furnish a Material Inspection and Receiving Report (DD Form 250 series) prepared in an original and 13 copies.

(b) The Contractor shall prepare the DD Form 250 in accordance with NASA FAR Supplement 1846.6. The Contractor shall enclose the copies of the DD Form 250 in the package or seal them in a waterproof envelope, which shall be securely attached to the exterior of the package in the most protected location.

(c) When more than one package is involved in a shipment, the Contractor shall list on the DD Form 250, as additional information, the quantity of packages and the package numbers. The Contractor shall forward the DD Form 250 with the lowest numbered package of the shipment and print the words "CONTAINS DD FORM 250" on the package.

(End of Clause)

E.5 Human Space Flight Item (NFS 1852.246-73)(Mar 1997)

The Contractor shall include the following statement in all subcontracts and purchase orders placed by it in support of this contract, without exception as to amount or subcontract level:

"FOR USE IN HUMAN SPACE FLIGHT; MATERIALS,
MANUFACTURING, AND WORKMANSHIP OF HIGHEST QUALITY
STANDARDS ARE ESSENTIAL TO ASTRONAUT SAFETY.

IF YOU ARE ABLE TO SUPPLY THE DESIRED ITEM WITH A HIGHER
QUALITY THAN THAT OF THE ITEMS SPECIFIED OR PROPOSED, YOU

ARE REQUESTED TO BRING THIS FACT TO THE IMMEDIATE
ATTENTION OF THE PURCHASER.”

(End of Clause)

[End of Section]

Section F - Deliveries or Performance

F.1 Listing of Clauses Incorporated by Reference

The following contract clauses pertinent to this section are hereby incorporated by reference:

I. Federal Acquisition Regulation (48 CFR Chapter 1)

Clause Number	Date	Title
52.242-15	Aug 1989	Stop-Work Order (Alt 1)(Apr 1984)
52.247-29	Feb 2006	F.O.B. Origin
52.247-30	Feb 2006	F.O.B. Origin, Contractor's Facility
52.247-31	Feb 2006	F.O.B. Origin, Freight Allowed
52.247-62	Apr 1984	Specific Quantities Unknown

II. NASA FAR Supplement (48 CFR Chapter 18) Clauses

Clause Number	Date	Title
1852.247-73	Jun 2002	Bills of Lading
Insert: Silvia Hanagriff, Traffic Management Specialist, Mail Code: JB7, 2101 NASA Parkway, Houston, TX 77058, Phone: (281) 483-6507		

(End of Clause)

F.2 Period of Performance

All work required under this contract, including submissions of all reports, shall be completed on or before December 31, 2010.

(End of Clause)

F.3 Option to Extend the Term of the Contract (FAR 52.217-9)(Mar 2000)

(a) The Government may extend the term of this contract by written notice to the Contractor within 30 days of the period of performance set forth in F.2; provided that the Government gives the Contractor a preliminary written notice of its intent to extend at least 60 days before the contract expires. The preliminary notice does not commit the Government to an extension.

Section F

- (b) If the Government exercises this option, the extended contract shall be considered to include this option clause.
- (c) OPTION 1 - The period of performance for Option One is from October 1, 2010, to September 30, 2011. Upon exercise of this option, the following changes will be made:
- (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$2,541,789 CND to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Paragraph (b) of Section B.2 shall be modified to reflect the addition of \$4,080,000 for IDIQ NTE.
 - (3) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance to from September 30, 2010 to September 30, 2011.
- (d) OPTION 2 - The period of performance for Option Two is from October 1, 2011, to December 31, 2012. Upon exercise of this option, the following changes will be made:
- (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$3,171,067 to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Paragraph (b) of Section B.2 shall be modified to reflect the addition of \$4,080,000 for IDIQ NTE.
 - (3) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance to from September 30, 2011 to December 31, 2012.
- (e) Shuttle Extension: Option 3 – The period of performance for Option Three is from January 1, 2011 to January 31, 2011. Upon exercise of this option, the following changes will be made:
- (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$869,979 CD to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance from December 31, 2010 to January 31, 2011.
- (f) Shuttle Extension: Option 4 – The period of performance for Option Four is from February 1, 2011 to February 28, 2011. Upon exercise of this option, the following changes will be made:
- (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$890,871 CD to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance from January 31, 2011 to February 28, 2011.
- (g) Shuttle Extension: Option 5 – The period of performance for Option Five is from March 1, 2011 to March 31, 2011. Upon exercise of this option, the following changes will be made:

Section F

- (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$983,735 CD to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance from February 28, 2011 to March 31, 2011.
- (h) Shuttle Extension: Option 6 – The period of performance for Option Six is from April 1, 2011 to April 30, 2011. Upon exercise of this option, the following changes will be made:
 - (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$869,979 CD to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance from March 31, 2011 to April 30, 2011.
- (i) Shuttle Extension: Option 7 – The period of performance for Option Seven is from May 1, 2011 to May 31, 2011. Upon exercise of this option, the following changes will be made:
 - (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$892,565 CD to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance from April 30, 2011 to May 31, 2011.
- (j) Shuttle Extension: Option 8 – The period of performance for Option Four is from June 1, 2011 to June 30, 2011. Upon exercise of this option, the following changes will be made:
 - (1) Paragraph (a) of Section B.2 entitled "Contract Value" shall be modified to reflect the addition of \$958,540 CD to the estimated cost. The USD amount will be updated using the most current exchange rate.
 - (2) Section F.2 entitled "Period of Performance" shall be modified to extend the period of performance from May 31, 2011 to June 30, 2011.

(End of Clause)

F.4 Flight Item (JSC 52.247-95)(Sep 1989)(JSC Procurement Instruction)

Block 16 of each DD Form 250 prepared for hardware or equipment to be shipped under this contract must be annotated as follows in 1/4 - inch letters or larger by handprinting or rubber stamp:

"THIS IS A FLIGHT ITEM" or "THIS IS MISSION ESSENTIAL GROUND SUPPORT EQUIPMENT," as applicable.

(End of Clause)

[End of Section]

Section G - Contract Administration Data

G.1 Listing of Clauses Incorporated by Reference

The following contract clauses pertinent to this section are hereby incorporated by reference:

I. Federal Acquisition Regulation (48 CFR Chapter 1)

Clause Number	Date	Title
No FAR By Reference clauses in Section G.		

II. NASA FAR Supplement (48 CFR Chapter 18) Clauses

Clause Number	Date	Title
1852.227-70	May 2002	New Technology (This clause applies for work performed by United States companies that are large entities)
1852.227-85	Apr 1986	Invention Reporting and Rights – Foreign. This clause applies to work performed outside of the United States by any contractors or subcontractors that are not domestic firms.

(End of Clause)

G.2 Submission of Vouchers for Payment (NFS 1852.216-87)(Mar 1998)

- (a) Public vouchers for payment of costs shall include a reference to this contract NNJ08GA03C and be forwarded to:

NASA Lyndon B. Johnson Space Center
BV/Shuttle Procurement Office
Attention: Suzan P. Moody, Contracting Officer
Houston, TX 77058

This is the designated billing office for cost vouchers for purposes of the Prompt Payment clause of this contract.

- (b) The Contractor shall prepare vouchers as follows:
(1) One original Standard Form (SF 1034, SF 1035, or equivalent Contractor's attachment.

(2) Twelve copies of SF 1034A, SF 1035A, or equivalent Contractor's attachment.

(c) Public vouchers for payment of fee shall be prepared similarly and be forwarded to:

NASA Lyndon B. Johnson Space Center
BV/Shuttle Procurement Office
Attention: Suzan P. Moody, Contracting Officer
Houston, TX 77058

This is the designated billing office for fee vouchers for purposes of the Prompt Payment clause of this contract.

(d) In the event that amounts are withheld from payment in accordance with provisions of this contract, a separate voucher for the amount withheld will be required before payment for that amount may be made.

(End of Clause)

G.3 Designation of New Technology Representative and Patent Representative (NFS 1852.227-72)(Jul 1997)

(a) For purposes of administration of the clause of this contract entitled "New Technology" or "Patent Rights--Retention by the Contractor (Short Form)," whichever is included, the following named representatives are hereby designated by the Contracting Officer to administer such clause:

Title	Name	Office Code	Address (including zip code)
New Technology Representative	Jane I. Fox	AF2	2101 NASA Parkway, Houston Texas 77058
Patent Representative	Edward K. Fein	AL	2101 NASA Parkway, Houston Texas 77058

(b) Reports of reportable items, and disclosure of subject inventions, interim reports, final reports, utilization reports, and other reports required by the clause, as well as any correspondence with respect to such matters, should be directed to the New Technology Representative unless transmitted in response to correspondence or request from the Patent Representative. Inquires or requests regarding disposition of rights, election of rights, or related matters should be directed to the Patent Representative. This clause shall be included in any subcontract hereunder requiring a "New Technology" clause or "Patent Rights--Retention by the Contractor (Short Form)" clause, unless otherwise authorized or directed by the Contracting Officer. The respective responsibilities and authorities of the above-named representatives are set forth in 1827.305-370 of the NASA FAR Supplement.

(End of Clause)

G.4 Technical Direction (NFS 1852.242-70)(Sep 1993)

(a) Performance of the work under this contract is subject to the written technical direction of the Contracting Officer Technical Representative (COTR), who shall be specifically appointed by the Contracting Officer in writing in accordance with NASA FAR Supplement 1842.270. "Technical direction" means a directive to the Contractor that approves approaches, solutions, designs, or refinements; fills in details or otherwise completes the general description of work or documentation items; shifts emphasis among work areas or tasks; or furnishes similar instruction to the Contractor. Technical direction includes requiring studies and pursuit of certain lines of inquiry regarding matters within the general tasks and requirements in Section C of this contract.

(b) The COTR does not have the authority to, and shall not, issue any instruction purporting to be technical direction that--

- (1) Constitutes an assignment of additional work outside the statement of work;
- (2) Constitutes a change as defined in the changes clause;
- (3) Constitutes a basis for any increase or decrease in the total estimated contract cost, the fixed fee (if any), or the time required for contract performance;
- (4) Changes any of the expressed terms, conditions, or specifications of the contract; or
- (5) Interferes with the contractor's rights to perform the terms and conditions of the contract.

(c) All technical direction shall be issued in writing by the COTR.

(d) The Contractor shall proceed promptly with the performance of technical direction duly issued by the COTR in the manner prescribed by this clause and within the COTR's authority. If, in the Contractor's opinion, any instruction or direction by the COTR falls within any of the categories defined in paragraph (b) of this clause, the Contractor shall not proceed but shall notify the Contracting Officer in writing within 5 working days after receiving it and shall request the Contracting Officer to take action as described in this clause. Upon receiving this notification, the Contracting Officer shall either issue an appropriate contract modification within a reasonable time or advise the Contractor in writing within 30 days that the instruction or direction is--

- (1) Rescinded in its entirety; or
- (2) Within the requirements of the contract and does not constitute a change under the changes clause of the contract, and that the Contractor should proceed promptly with its performance.

(e) A failure of the contractor and contracting officer to agree that the instruction or direction is both within the requirements of the contract and does not constitute a change under the changes clause, or a failure to agree upon the contract action to be taken with respect to the instruction or direction, shall be subject to the Disputes clause of this contract.

(f) Any action(s) taken by the contractor in response to any direction given by any person other than the Contracting Officer or the COTR shall be at the Contractor's risk.

(End of Clause)

**G.5 NASA Contractor Financial Management Reporting (NFS 1852.242-73)
(Jul 2000)**

(a) The Contractor shall submit NASA Contractor Financial Management Reports on NASA Forms 533 in accordance with the instructions in NASA Procedures and Guidelines (NPG) 9501.2, NASA Contractor Financial Management Reporting, and on the reverse side of the forms, as supplemented in the Schedule of this contract. The detailed reporting categories to be used, which shall correlate with technical and schedule reporting, shall be set forth in the Schedule. Contractor implementation of reporting requirements under this clause shall include NASA approval of the definitions of the content of each reporting category and give due regard to the Contractor's established financial management information system.

(b) Lower level detail used by the Contractor for its own management purposes to validate information provided to NASA shall be compatible with NASA requirements.

(c) Reports shall be submitted in the number of copies, at the time, and in the manner set forth in the Schedule or as designated in writing by the Contracting Officer. Upon completion and acceptance by NASA of all contract line items, the Contracting Officer may direct the Contractor to submit Form 533 reports on a quarterly basis only, report only when changes in actual cost occur, or suspend reporting altogether.

(d) The Contractor shall ensure that its Form 533 reports include accurate subcontractor cost data, in the proper reporting categories, for the reporting period.

(e) If during the performance of this contract NASA requires a change in the information or reporting requirements specified in the Schedule, or as provided for in paragraph (a) or (c) of this clause, the Contracting Officer shall effect that change in accordance with the Changes clause of this contract.

(End of Clause)

**G.6 Contractor Requests for Government-Provided Property
(NFS 1852.245-70)(Sep 2007)(DEVIATION)**

(a) The Contractor shall provide all property required for the performance of this contract. The Contractor shall not acquire or construct items of property to which the Government will have title under the provisions of this contract without the Contracting

Officer's written authorization. Property which will be acquired as a deliverable end item as material or as a component for incorporation into a deliverable end item is exempt from this requirement.

(b) (1) In the event the Contractor is unable to provide the property necessary for performance, and the Contractor requests provision of property by the Government, the Contractor's request shall--

- (i) Justify the need for the property;
- (ii) Provide the reasons why contractor-owned property cannot be used;
- (iii) Describe the property in sufficient detail to enable the Government to screen its inventories for available property or to otherwise acquire property, including applicable manufacturer, model, part, catalog, National Stock Number or other pertinent identifiers;
- (iv) Combine requests for quantities of items with identical descriptions and estimated values when the estimated values do not exceed \$100,000 per unit; and
- (v) Include only a single unit when the acquisition or construction value equals or exceeds \$100,000.

(2) Contracting Officer authorization is required for items the Contractor intends to manufacture as well as those it intends to purchase.

(3) The Contractor shall submit requests to the Contracting Officer no less than 30 days in advance of the date the Contractor would, should it receive authorization, acquire or begin fabrication of the item.

(c) The Contractor shall maintain copies of Contracting Officer authorizations, appropriately cross-referenced to the individual property record, within its property management system.

(d) Property furnished from Government excess sources is provided as-is, where-is. The Government makes no warranty regarding its applicability for performance of the contract or its ability to operate. Failure of property obtained from Government excess sources under this clause is insufficient reason for submission of requests for equitable adjustments discussed in the clause at 52.245-1, Government Property.

(End of Clause)

G.7 Financial Reporting of NASA Property in the Custody of Contractors (NFS 1852.245-73)(Sep 2007)

(a) The Contractor shall submit annually a NASA Form (NF) 1018, NASA Property in the Custody of Contractors, in accordance with the provisions of 1845.505-14, the instructions on the form, subpart 1845.71, and any supplemental instructions for the current reporting period issued by NASA.

(b) (1) Subcontractor use of NF 1018 is not required by this clause; however, the Contractor shall include data on property in the possession of subcontractors in the annual NF 1018.

(2) The Contractor shall mail the original signed NF 1018 directly to the cognizant NASA Center Deputy Chief Financial Officer, Finance, unless the Contractor uses the NF 1018 Electronic Submission System (NESS) for report preparation and submission.

(3) One copy shall be submitted (through the Department of Defense (DOD) Property Administrator if contract administration has been delegated to DOD) to the following address: [Insert name and address of appropriate NASA Center office.], unless the Contractor uses the NF 1018 Electronic Submission System (NESS) for report preparation and submission.

(c) (1) The annual reporting period shall be from October 1 of each year through September 30 of the following year. The report shall be submitted in time to be received by October 15. The information contained in these reports is entered into the NASA accounting system to reflect current asset values for agency financial statement purposes. Therefore, it is essential that required reports be received no later than October 15. Some activity may be estimated for the month of September, if necessary, to ensure the NF 1018 is received when due. However, contractors' procedures must document the process for developing these estimates based on planned activity such as planned purchases or NASA Form 533 (NF 533 Contractor Financial Management Report) cost estimates. It should be supported and documented by historical experience or other corroborating evidence, and be retained in accordance with FAR Subpart 4.7, Contractor Records Retention. Contractors shall validate the reasonableness of the estimates and associated methodology by comparing them to the actual activity once that data is available, and adjust them accordingly. In addition, differences between the estimated cost and actual cost must be adjusted during the next reporting period. Contractors shall have formal policies and procedures, which address the validation of NF 1018 data, including data from subcontractors, and the identification and timely reporting of errors. The objective of this validation is to ensure that information reported is accurate and in compliance with the NASA FAR Supplement. If errors are discovered on NF 1018 after submission, the contractor shall contact the cognizant NASA Center Industrial Property Officer (IPO) within 30 days after discovery of the error to discuss corrective action.

(2) The Contracting Officer may, in NASA's interest, withhold payment until a reserve not exceeding \$25,000 or 5 percent of the amount of the contract, whichever is less, has been set aside, if the Contractor fails to submit annual NF 1018 reports in accordance with 1845.505-14 and any supplemental instructions for the current reporting period issued by NASA. Such reserve shall be withheld until the Contracting Officer has determined that NASA has received the required reports. The withholding of any amount or the subsequent payment thereof shall not be construed as a waiver of any Government right.

(d) A final report shall be submitted within 30 days after disposition of all property subject to reporting when the contract performance period is complete in accordance with (b)(1) through (3) of this clause.

(End of Clause)

**G.8 Identification and Marking of Government Equipment (NFS 1852.245-74)
(Sep 2007)(DEVIATION)**

(a) The Contractor shall identify all equipment to be delivered to the Government using NASA Technical Handbook (NASA-HDBK) 6003, Application of Data Matrix Identification Symbols to Aerospace Parts Using Direct Part Marking Methods/Techniques, and NASA Standard (NASA-STD) 6002, Applying Data Matrix Identification Symbols on Aerospace Parts Handbook. This includes deliverable equipment listed in the schedule and other equipment when NASA directs physical transfer to NASA or a third party. The Contractor shall identify property in both machine and human readable form unless the use of a machine readable-only format is approved by the NASA Industrial Property Officer.

(b) Property shall be marked in a location that will be human readable, without disassembly or movement of the property, when the items are placed in service unless such placement would have a deleterious effect on safety or on the item's operation.

(c) Concurrent with equipment delivery or transfer, the Contractor shall provide the following data in an electronic spreadsheet format:

- (1) Item Description.
- (2) Unique Identification Number (License Tag).
- (3) Unit Price.
- (4) An explanation of the data used to make the unique identification number.

(d) For items physically transferred under paragraph (a) the following additional data is required:

- (1) Date originally placed in service.
- (2) Item condition.
- (3) Date last serviced.

(e) The data required in paragraphs (c) and (d) shall be delivered to the NASA center receiving activity listed below:

NASA/Lyndon B. Johnson Space Center
Attention: JA/Industrial Property Officer
2101 NASA Parkway
Houston Texas 77058

(f) The contractor shall include the substance of this clause, including this paragraph (f), in all subcontracts that require delivery of equipment.

(End of Clause)

G.9 Property Management Changes (NFS 1852.245-75)(Sep 2007)(DEVIATION)

(a) The Contractor shall submit any changes to standards and practices used for management and control of Government property under this contract to the assigned property administrator and Industrial Property Officer (IPO), prior to making the change whenever the change --

- (1) Employs a standard that allows increase in thresholds or changes the timing for reporting loss, damage, or destruction of property;
- (2) Alters physical inventory timing or procedures;
- (3) Alters recordkeeping practices;
- (4) Alters practices for recording the transport or delivery of Government property; or
- (5) Alters practices for disposition of Government property.

(b) The Contractor shall contact the IPO at:

NASA/Lyndon B. Johnson Space Center
Attention: JA/Sina J. Hawsey, Industrial Property Officer
2101 NASA Parkway, Houston Texas 77058
(281) 483-6582 (phone)/Sina.J.Hawey@nasa.gov (email)

(End of Clause)

**G.10 List Of Government Property Furnished Pursuant To FAR 52.245-1
(NFS 1852.245-76)(Sep 2007)(DEVIATION)**

(a) For performance of work under this contract, the Government will make available Government property identified below or in Attachment J-5 of this contract on a no-charge-for-use basis pursuant to the clause at FAR 52.245-1, Government Property. The Contractor shall use this property in the performance of this contract at MDA (Brampton), MDA (Montreal), and MDA (Federal) and at other location(s) as may be approved by the Contracting Officer. Under FAR 52.245-1, the Contractor is accountable for the identified property.

Item Description	Acquisition Date	Acquisition Cost	Quantity	If equipment		
				Manufacturer	Model	Serial Number
*	*	*	*	*	*	*

* See Attachment J-5, "Government Property".

(End of Clause)

G.11 Physical Inventory of Capital Personal Property (NFS 1852.245-78)

(Sep 2007)(DEVIATION)

(a) In addition to physical inventory requirements under the clause at FAR 52.245-1, Government Property, the Contractor shall conduct annual physical inventories for individual property items with an acquisition cost exceeding \$100,000.

- (1) The Contractor shall inventory --
 - (i) Items of property furnished by the Government;
 - (ii) Items acquired by the Contractor and titled to the Government under the clause at FAR 52.245-1;
 - (iii) Items constructed by the Contractor and not included in the deliverable, but titled to the Government under the clause at FAR 52.245-1; and
 - (iv) Complete but undelivered deliverables.
- (2) The Contractor shall use the physical inventory results to validate the property record data, specifically location, condition and use status, and to prepare summary reports of inventory as described in paragraph (c) of this clause.

(b) Unless specifically authorized in writing by the NASA Industrial Property Officer (IPO), the inventory shall be performed and posted by individuals other than those assigned custody of the items, responsibility for maintenance, or responsibility for posting to the property record. The Contractor may request a waiver from this separation of duties requirement from the NASA IPO, when all of the conditions in either (1) or (2) below are met.

- (1) The Contractor utilizes an electronic system for property identification, such as a laser bar-code reader or radio frequency identification reader, and
 - (i) The programs or software preclude manual data entry of inventory identification data by the individual performing the inventory; and
 - (ii) The inventory and property management systems contain sufficient management controls to prevent tampering and assure proper posting of collected inventory data.
- (2) The Contractor has limited quantities of property, limited personnel, or limited property systems; and
 - (i) The Contractor provides written confirmation that the Government property exists in the recorded condition and location; and
 - (ii) The items continue to be used exclusively for performance of the contract or as otherwise authorized by the Contracting Officer.
- (3) The Contractor shall submit the request to the cognizant property administrator and obtain approval from the IPO prior to implementation of the practice.

(c) The Contractor shall report the results of the physical inventory to the property administrator and the NASA Industrial Property Officer within 10 calendar days of completion of the physical inventory. The report shall --

- (1) Provide a summary showing number and value of items inventoried; and
- (2) Include additional supporting reports of --
 - (i) Loss, damage or destruction, in accordance with the clause at 52.245-1, Government Property;
 - (ii) Idle property available for reuse or disposition; and

(iii) A summary of adjustments made to location, condition, status, or user as a result of the physical inventory reconciliation.

(d) The Contractor shall retain all physical inventory records, including records of all transactions associated with inventory reconciliation. All records shall be subject to Government review and/or audit.

(End of Clause)

**G.12 Occupancy Management Requirements (NFS 1852.245-82)(Sep 2007)
(DEVIATION)**

(a) In addition to the requirements of the clause at FAR 52.245-1, Government Property, the Contractor shall comply with the following in performance of work in and around Government real property:

- (1) NPD 8800.14, Policy for Real Property Management.
- (2) NPR 8831.2, Facility Maintenance Management

(b) The Contractor shall obtain the written approval of the Contracting Officer before installing or removing Contractor-owned property onto or into any Government real property or when movement of Contractor-owned property may damage or destroy Government-owned property. The Contractor shall restore damaged property to its original condition at the Contractor's expense.

(c) The Contractor shall not acquire, construct or install any fixed improvement or structural alterations in Government buildings or other real property without the advance, written approval of the Contracting Officer. Fixed improvement or structural alterations, as used herein, means any alteration or improvement in the nature of the building or other real property that, after completion, cannot be removed without substantial loss of value or damage to the premises. Title to such property shall vest in the Government.

(d) The Contractor shall report any real property or any portion thereof when it is no longer required for performance under the contract, as directed by the Contracting Officer.

(End of Clause)

**G.13 Security Badging Requirements for Foreign National Visitors and
Employees/Representative of Foreign Contractors (JSC 52.204-91)(Jan 2006)
(JSC Procurement Instruction)**

(a) An employee of a domestic Johnson Space Center (JSC) contractor or its subcontractor who is not a U.S. citizen (foreign national) may not be admitted to the JSC site for purposes of performing work without special arrangements. In addition, all employees or representatives of a foreign JSC contractor/subcontractor may not be admitted to the JSC site without special arrangements. For employees as described above, advance notice must be given to the Security Office of the host installation, [JSC

or White Sands Test Facility (WSTF)] at least three weeks prior to the scheduled need for access to the site so that instructions on obtaining access may be provided.

(b) All visit/badge requests for persons described in (a) above must be entered in the NASA Request for Request (RFR) and Foreign National Management System (NFMMS) for acceptance, review, concurrence, and approval purposes. When an authorized company official requests a JSC or WSTF badge for site access, he/she is certifying that steps have been taken to ensure that its contractor or subcontractor employees, visitors, or representatives will not be given access to export-controlled or classified information for which they are not authorized. These individuals shall serve as the contractor's representative(s) in certifying that all visit/badge request forms are processed in accordance with JSC and WSTF security and export control procedures. No foreign national, representative, or resident alien contractor/subcontractor employee shall be granted access into JSC or WSTF until a completed RFR has been approved and processed through the NFMMS. Unescorted access will not be granted unless a favorable National Agency Check (NAC) has been completed by the JSC Security Office.

(c) The contractor agrees that it will not employ for the performance of work onsite at JSC or WSTF any individuals who are not legally authorized to work in the United States. If the JSC or WSTF Industrial Security Specialist or the contracting officer has reason to believe that any employee of the contractor may not be legally authorized to work in the United States and/or on the contract, the contractor may be required to furnish copies of Form I-9 (Employment Eligibility Verification), U.S. Department of Labor Application for Alien Employment Certification, and any other type of employment authorization document.

(d) The contractor agrees to provide the information requested by JSC or WSTF Security Office in order to comply with NASA policy directives and guidelines related to foreign visits to NASA facilities so that (1) the visitor/employee/ representative may be allowed access to JSC or other NASA centers for performance of this contract, (2) required investigations can be conducted, and (3) required annual or revalidation reports can be submitted to NASA Headquarters. All requested information must be submitted in a timely manner in accordance with instructions provided by JSC or any other center to be visited.

(End of Clause)

G.14 Identification of Employees (JSC 52.242-92)(Oct 2006)(JSC Procurement Instruction)

(a) At all times while on Government property, the contractor, subcontractors, their employees, and agents shall wear badges which will be issued by the NASA Badging & Visitor Control Office, located in Building 110 at the Johnson Space Center (JSC), or at the Main Gate at the White Sands Test Facility (WSTF). JSC employee credentials and visitor badges will be issued only between the hours of 6:00 a.m. to 7:30 p.m., Monday through Friday, and 7:30 am to 3:00 pm on Saturday. WSTF employee badges will be issued only between the hours of 8 a.m. to 2 p.m., Monday through Friday. WSTF visitor

badges will be issued on a 7-day-a-week, 24-hour-a-day basis. Resident aliens and foreign nationals/representatives shall be issued green foreign national badges.

(b) Each individual who wears a badge shall be required to sign personally for the badge. The contractor shall be held accountable for issued badges and all other related items and must assure that they are returned to the NASA Badging & Visitor Control Offices upon completion of work under the contract in accordance with Security Management Directive (SMD) 500-15, "Security Termination Procedures." Failure to comply with the NASA contractor termination procedures upon completion of the work (e.g., return of badges, decals, keys, Controlled Access Area cards, clearance terminations, JSC Public Key Infrastructure (PKI)/special program deletions, etc.) may result in final payment being delayed.

(End of Clause)

G.15 Technical Information Releases

During the performance of this contract, if data relating to this contract is proposed to be used in oral or written presentations at professional meetings, seminars, and symposia, or in articles to be published in professional, scientific, and technical journals and similar media, the Contractor shall request a review by the Contracting Officer of such proposed publication. Such requests shall be submitted on a NASA Form (NF) 1676 (JSC) and forwarded to the Contracting Officer (Code BV) at least four weeks in advance of the desired response date to provide sufficient time for review and comments to the Contractor.

(End of Clause)

[End of Section]

Section H – Special Contract Requirements

H.1 Listing of Clauses Incorporated by Reference

The following contract clauses pertinent to this section are hereby incorporated by reference:

I. Federal Acquisition Regulation (48 CFR Chapter 1)

Clause

<u>Number</u>	<u>Date</u>	<u>Title</u>
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No FAR By Reference clauses in Section H.

II. NASA FAR Supplement (48 CFR Chapter 18) Clauses

Clause

<u>Number</u>	<u>Date</u>	<u>Title</u>
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1852.223-70	Apr 2002	Safety and Health
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1852.223-75	Feb 2002	Major Breach of Safety or Security
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1852.228-72	Sep 1993	Cross-Waiver of Liability for Space Shuttle Services
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1852.228-76	Dec 1994	Cross-Waiver of Liability for Space Station Activities
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1852.242-72	Aug 1992	Observance of Legal Holidays (Alt I)(Sep 1989)
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(End of Clause)

H.2 Contract in the English Language

All correspondence, proposals, engineering change proposals and technical documentation shall be completed in the English language.

(End of Clause)

H.3 Task Ordering Procedure (NFS 1852.216-80)(Oct 1996)

(a) Only the Contracting Officer may issue task orders to the Contractor, providing specific authorization or direction to perform work within the scope of the contract and as specified in the schedule. Both Fixed-Price and Cost-Plus-Fixed-Fee task orders may be issued under the IDIQ feature. The Contractor may incur costs under this contract in performance of task orders and task order modifications issued in accordance with this clause. No other costs are authorized unless otherwise specified in the contract or expressly authorized by the Contracting Officer.

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- (b) Prior to issuing a task order, the Contracting Officer shall provide the Contractor with the following data:
- (1) A functional description of the work identifying the objectives or results desired from the contemplated task order.
 - (2) Proposed performance standards to be used as criteria for determining whether the work requirements have been met.
 - (3) A request for a task plan from the Contractor to include the technical approach, period of performance, appropriate cost information, and any other information required to determine the reasonableness of the Contractor's proposal.
- (c) Within 15 calendar days after receipt of the Contracting Officer's request, the Contractor shall submit a task plan conforming to the request. The contractor will use the rates that are stated in Attachment J-2, Canadian Commercial Corporation (CCC) Fixed Rates, to price each task plan.
- (d) After review and any necessary discussions, the Contracting Officer may issue a task order to the Contractor containing, as a minimum, the following:
- (1) Date of the order.
 - (2) Contract number and order number.
 - (3) Functional description of the work identifying the objectives or results desired from the task order, including special instructions or other information necessary for performance of the task.
 - (4) Performance standards, and where appropriate, quality assurance standards.
 - (5) Maximum dollar amount authorized (cost and fee or price). This includes allocation of award fee among award fee periods, if applicable.
 - (6) Any other resources (travel, materials, equipment, facilities, etc.) authorized.
 - (7) Delivery/performance schedule including start and end dates.
 - (8) If contract funding is by individual task order, accounting and appropriation data.
- (e) The Contractor shall provide acknowledgment of receipt to the Contracting Officer within 3 calendar days after receipt of the task order.
- (f) If time constraints do not permit issuance of a fully defined task order in accordance with the procedures described in paragraphs (a) through (d), a task order which includes a ceiling price may be issued.
- (g) The Contracting Officer may amend tasks in the same manner in which they were issued.
- (h) In the event of a conflict between the requirements of the task order and the Contractor's approved task plan, the task order shall prevail.

H.4 Key Personnel and Facilities (NFS 1852.235-71)(Mar 1989)

(a) The personnel and/or facilities listed below (or specified in the contract Schedule) are considered essential to the work being performed under this contract. Before removing, replacing, or diverting any of the listed or specified personnel or facilities, the Contractor shall (1) notify the Contracting Officer reasonably in advance and (2) submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on this contract.

(b) The Contractor shall make no diversion without the Contracting Officer's written consent; provided, that the Contracting Officer may ratify in writing the proposed change, and that ratification shall constitute the Contracting Officer's consent required by this clause.

(c) The list of personnel and/or facilities shown below may, with the consent of the contracting parties, be amended from time to time during the course of the contract to add or delete personnel and/or facilities.

MDA Title

Shuttle Remote Manipulator System Program Director
MDA Brampton, Ontario Facility

Name

A. P Higson

(End of Clause)

H.5 Mission Critical Space Systems Personnel Reliability Program (NFS 1852.246-70)(Mar 1997)

(a) In implementation of the Mission Critical Space System Personnel Reliability Program, described in 14 CFR 1214.5, the Government shall identify personnel positions that are mission critical. Some of the positions as identified may now or in the future be held by employees of the Contractor. Upon notification by the Contracting Officer that a mission-critical position is being or will be filled by one or more of the Contractor's employees, the Contractor shall (1) provide the affected employees with a clear understanding of the investigative and medical requirements and, (2), to the extent permitted by applicable law, assist the Government by furnishing personal data and medical records.

(b) The standard that will be used in certifying individuals for a mission-critical position is that they must be determined to be suitable, competent, and reliable in the performance of their assigned duties in accordance with the screening requirements 14 CFR 1214.5. If the Government determines that a Contractor employee occupying or nominated to occupy a mission-critical position will not be certified for such duty, the Contracting Officer shall (1) furnish to the employee the specific reasons for its action; (2) advise the employee that he/she may avail himself/herself of the review procedures that are a part of the certification system; and (3) furnish him/her a copy of those

procedures upon request.

(c) If a Contractor employee who has been nominated for (but has not yet filled) a mission-critical position is not certified, the Contractor agrees to defer the appointment to the position until the employee has had an opportunity to pursue the referenced procedures. If the employee is an incumbent to the position, the Contractor agrees, upon the request of the Government, to remove him/her from the position temporarily pending an appeal of the action under the review procedures. If any employee not certified elects not to take action under the procedures, or, if having taken action, is not successful in obtaining a reversal of the determination, the Contractor agrees not to appoint the employee to the position, or if already appointed, to promptly remove the employee.

(End of Clause)

H.6 Transmission of Documentation

(a) Whenever this contract requires or permits any report, notice, or other documentation (except invoices/vouchers) to be supplied by the Contractor to the Government, the Contracting Officer or other designated Government representative, the Government deems such requirement to have been satisfied if such report, notice, or other documentation originated from the contractor.

(b) Whenever this contract requires or permits any report, notice, invoice, voucher, or other documentation to be supplied by the Government to the Contractor, a copy thereof shall be transmitted simultaneously to the Subcontractor.

(c) Nothing contained in this clause shall be construed to restrict the right of the Government to communicate directly with the Contractor without consulting MDA.

(End of Clause)

H.7 Impact of the 1956 Letter of Agreement Between the Governments of Canada and the United States

It is recognized that by exchange of letters between the Canadian Department of Defense Production (DDP) and NASA that the DDP and NASA in general agreed that the policies and procedures set forth in the Letter of Agreement between the DDP and the U.S. Department of Defense, as published previously in DOD FAR Supplement 225.870 (Appendix T. Subpart 2; T-201.1) on the effective date of the contract will be applicable to contracts entered into between NASA and the Canadian Commercial Corporation. It is agreed by the parties hereto that no exception to that agreement, except as may be limited by the said exchange of letters, is intended to be made by this contract.

(End of Clause)

H.8 Choice of Law

The rights and obligations of the parties of this contract shall be ascertainable by recourse to the laws of the United States.

(End of Clause)

H.9 Contractor's U.S. License Rights in Patents

The Contractor must insert this clause in its subcontract with the Subcontractor:

With reference to the "Invention Reporting and Rights-Foreign" clause of this contract (NFS 1852.227-85), the Contractor is hereby granted a revocable, nonexclusive, royalty-free license in each patent application filed in the United States on any invention made in the performance of work under this contract and promptly reported to the Contracting Officer and in any resulting patent in which the Government obtains title. The Contractor's license includes the right to grant sublicenses of the same scope to the extent the Contractor was legally obligated to do so at the time the contract was awarded. The license is transferable only with the approval of the Contracting Officer except when transferred to the successor of that part of the Contractor's business to which the invention pertains. The license may be terminated or modified to the extent necessary to achieve expeditious practical application of the invention pursuant to an application of exclusive license submitted in accordance with the NASA Patent Licensing Regulations (14 CFR Part 1245). However, the license will not be terminated in that field of use or the geographical areas in which the Contractor has achieved practical application and continue to make the benefits of the invention reasonably accessible to the public. The Contractor has the rights provided by Section 1245.210 of the Patent Licensing Regulations cited above to receive prior notice of any intent to terminate or modify this license and to respond to such notice, and also the right to appeal any such action as provided by Section 1245.211 thereof.

(End of Clause)

H.10 Data to be Provided to Shuttle Program Database Contractor

(a) NASA asserts and the Contractor recognizes that the Johnson Space Center (JSC) has entered into a contract with a contractor that has administrative responsibilities related to development and implementing a Shuttle Program database (this contractor is hereinafter referred to as "the Shuttle Program Database contractor"). Data will be furnished by NASA to the Shuttle Program Database contractor. This data may be regarded by the Contractor as being privileged or confidential (e.g., cost or pricing data in proposals and/or other sensitive business information). NASA further asserts and the Contractor further recognizes that the contract between JSC and the Shuttle Program Database contractor contains the following provision:

"H. HANDLING OF DATA

It is anticipated that in the performance of this contract, the Contractor may have access to and use of (1) NASA's sensitive internal budget, accounting, cost or pricing, or other financial data; and/or (2) sensitive trade secret, commercial, business, financial (cost or pricing) data of other contractors. The Contractor agrees that it will not use, copy, or disclose such data, or any other data arguably within these categories, except to the extent necessary to perform the work under this contract, and will not make any other use or disclosure of such data without prior specific written permission of the Contracting Officer."

(b) The Contractor agrees that the Government may provide to the Shuttle Program Database contract, or any successor contractor selected for the purpose of performing the same or similar contract work, data containing information provided to the Government in connection with this contract, or otherwise obtained by the Government, provided, (1) that the information is furnished the Shuttle Program Database contractor for purposes contemplated by the contract, and (2) contains the above quoted provision or one to substantially the same effect providing equivalent protection.

(End of Clause)

H.11 Special Provision for Contract Changes

(a) Notwithstanding the provisions of the *Changes* clause and the *Government Property* clause, 52.245-1, the parties agree changes made pursuant to the *Changes* clause shall give rise to an equitable adjustment in the estimated cost or fee, delivery schedule, or any other contract provision, when said change causes an increase or decrease in estimated cost. However, for any changes of \$100,000 of cost or less, such changes would not be negotiated and definitized into the contract, until the sum of all changes results in a contract value change of \$400,000 or more, or on a yearly basis, whichever is earlier. In the interim, a list of all such H.11 Contract Changes would be maintained by the Contractor and available to NASA.

(End of Clause)

H.12 Applicable Scope of Work for Options

Options One and Two (Space Station)

This section defines the scope of work applicable to contract Options One and Two. Options One and Two provide for the continued program infrastructure, engineering support, product support and hardware activities for the Space Station Program following closeout of the Space Shuttle Program. This includes continued support for the RWS and BCS as well as other items which may be developed or modified under this contract to support the Space Station Program.

Table 1 defines the statement of work elements which shall be included in Options One and Two. Table 2 defines the DRDs which shall be included in Options One and Two.

All other terms and conditions of the contract shall remain applicable to the option periods.

Table 1: SOW Applicability to Options One and Two

SOW Section	Description	Applicability to Options One & Two
C1.1	Program Infrastructure, Engineering and Product Support	As specified in subsections below.
C1.1.3.1	Program Infrastructure	Applicable
C1.1.3.2	Engineering Support	Only the following subsections are applicable: - C1.1.3.2.1.5 RWS / BCS / GF Sustaining Engineering - C1.1.3.2.3 JSC Support
C1.1.3.3	Product Support	Applicable
C1.2	Hardware Logistics, Maintenance, Overhaul and Repair	As directed by IDIQ Task Orders
C1.3	Hardware Development and Production (IDIQ)	As directed by IDIQ Task Orders
C1.4	Shuttle End of Program Closeout	As directed by IDIQ Task Orders

Table 2: DRD Applicability to Options One and Two

DRD	Applicability to Options One and Two	Comment
DRDs 1 – 37	Applicable	
DRD 38	Not Applicable	Headcount Report
DRD 39	Not Applicable	End of Program Plan
DRDs 40-41	Applicable	

Options Three through Eight (Space Shuttle)

This section defines the scope of work applicable to contract Options Three through Eight. Options Three through Eight provide for the continued Space Shuttle support based on the Shuttle Manifest changes.

Table 3 defines the statement of work elements which shall be included in Options Three through Eight. Table 4 defines the DRDs which shall be included in Options One and Two. All other terms and conditions of the contract shall remain applicable to the option periods.

Table 3: SOW Applicability to Options Three Through Eight

SOW Section	Description	Applicability to Options Three Through Eight
C.1.1.3.1	Program Infrastructure	As specified in subsections below:
C.1.1.3.1.1	Program Management	Applicable
C.1.1.3.1.2	Cost and Schedule	Applicable
C.1.1.3.1.3	Data Management	Applicable

C.1.1.3.1.4	Software Management	Applicable
C.1.1.3.1.5	Network Infrastructure	Applicable
C.1.1.3.1.6	Program Product Assurance	Applicable
C.1.1.3.1.7	Jeeves, Web Jeeves, and Mass Data Maintenance	Applicable
C.1.1.3.2	Engineering Support	As specified in subsections below:
C.1.1.3.2.1.2	SRMS Design Authority Liaison	Applicable
C.1.1.3.2.1.3	SRMS Trending, Diagnostics and Performance Analysis	Applicable
C.1.1.3.2.1.4	SRMS System Safety, Reliability and Performance Improvements	Applicable
C.1.1.3.2.2	KSC Support	Applicable
C.1.1.3.2.3	JSC Support	Applicable
C.1.1.3.2.5	ASAD Maintenance	Applicable
C.1.1.3.3	Product Support	Applicable
C.1.2.3.2	Maintenance	As specified in subsections below:
C.1.2.3.2.1	Investigation and Support of Delivered SRMS Flight Hardware	Applicable
C.1.2.3.2.2	SRMS Test Equipment Support	Applicable

Table 4: DRD Applicability to Options Three Through Eight

DRD	Applicability to Options Three Through Eight	Comment
DRDs 1 - 41	Applicable	

(End of Clause)

H.13 Disputes

(a) Any disputes concerning questions of fact or law arising under this Contract shall be referred by each party's cognizant Contracting Officer, or authorized representative, for negotiation and resolution.

(b) If a dispute cannot be resolved by the Contracting Officers, then the issue will be referred to Space Shuttle Program Manager and the Canadian Commercial Corporation ("CCC") Contract Authority.

(c) If the parties are still unable to resolve the dispute, the NASA Associate Administrator for Space Operations Mission Directorate, will seek to resolve the dispute and, if necessary, issue a written decision that shall be a final Agency decision for all purposes, including judicial review.

(d) Pending resolution of any disputes pursuant to this Article, the Parties agree that performance of all obligations shall continue to be pursued diligently in accordance with the direction of the NASA Contracting Officer.

(e) The Parties agree that this Disputes Resolution procedure shall be the exclusive procedure followed by the Parties in resolving any dispute arising under, or based on, an express or implied provision of this Contract.

(End of Clause)

H.14 Availability of Government Property

The lack of availability of government property due to an unsatisfactory property system, unsatisfactory completion of Corrective Action Plan items, or inventory on the part of the Contractor shall not give rise to a contract adjustment pursuant to the provisions of FAR 52.245-1.

(End of Clause)

H.15 Advance Agreement on Severance Payments

The Advance Agreement on Severance Payments is found at Attachment J-6.

(End of Clause)

H.16 Administrative Leave (JSC Procurement Instruction 52.242-94) (SEP 2008)

(a) When the NASA installation grants administrative leave to its Government employees (e.g., as a result of inclement weather, potentially hazardous conditions, or other special circumstances), the following personnel should also be dismissed upon notification of a center closure provided by the Contracting Officer:

1. Contractor personnel working on-site; and
2. Contractor personnel dedicated to the contract effort who are
 - A. working off-site within 10 miles of JSC; and
 - B. unable to perform their NASA contract duties at their off-site location because their normal place of business has been or is expected to be negatively impacted by an emergency situation (e.g. has sustained damage, has been evacuated, etc.).

However, the contractor shall provide sufficient on-site personnel to perform round-the-clock requirements of critical work already in process, unless otherwise instructed by the Contracting Officer or authorized representative.

(b) Administrative leave granted under this clause shall be subject to modification or

termination by the Contracting Officer and in all instances shall be subject to the availability of funds. The cost of salaries and wages to the Contractor for the period of any such excused absence shall be a reimbursable item of cost under this contract for effected employees in accordance with the Contractor's established accounting policy.

1. If a labor hour-based contract, administrative leave granted under this clause shall be accounted for consistent with productive hours under this contract for employees in accordance with the Contractor's established accounting policy.

2. For fixed price contracts based on other than labor hours for deliverables, the Contracting Officer and Contractor shall as a precondition to any reimbursement negotiate an advanced agreement to determine the appropriate method in which to grant administrative leave under this clause.

3. All invoices requesting payment under this clause shall be marked as "Administrative Leave in accordance with 52.242-94, Administrative Leave." All such invoices paid will be subject to review, audit, and revision when routine operations recommence.

(c) The Contractor shall include this clause in all services subcontracts that include personnel in the categories described in (a) above.

(End of clause)

[End of Section]

Part II – Contract Clauses**Section I - Contract Clauses**

I.1 Clauses Incorporated by Reference (FAR 52.252-2)(Feb 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at these address(es):

<http://www.acquisition.gov/far/index.html>

<http://farsite.hill.af.mil/vffara.htm>

<http://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm>

(End of Clause)

I. Federal Acquisition Regulation (48 CFR Chapter 1) Clauses

<u>Number</u>	<u>Title</u>	<u>Date</u>
52.202-1	Definitions	Jul 2004
52.203-3	Gratuities	Apr 1984
52.203-5	Covenant Against Contingent Fees	Apr 1984
52.203-6	Restrictions on Subcontract Sales to the Government	Sep 2006
52.203-7	Anti-Kickback Procedures	Jul 1995
52.203-8	Cancellation, Recession, and Recovery of Funds for Illegal or Improper Activity	Jan 1997
52.203-10	Price or Fee Adjustment for Illegal or Improper Activity	Jan 1997
52.203-12	Limitation on Payments To Influence Certain Federal Transactions	Sep 2005
52.204-1	Approval of Contract: Insert, <u>Director, Office of Procurement</u>	Dec 1989
52.204-4	Printing/Copying Double-Sided On Recycle Paper	Aug 2000
52.204-7	Central Contractor Registration	Jul 2006
52.204-9	Personal Identity Verification of Contractor Personnel	Nov 2006
52.209-6	Protecting the Governments Interest When Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment	Sep 2006
52.211-5	Material Requirements	Aug 2000
52.211-15	Defense Priority And Allocation Requirements	Sep 1990
52.215-2	Audit and Records -- Negotiation	Jun 1999
52.215-8	Order Of Precedence -- Uniform Contract Format	Oct 1997
<u>Number</u>	<u>Title</u>	<u>Date</u>

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52.215-10	Price Reduction For Defective Cost Or Pricing Data	Oct 1997
52.215-11	Price Reduction for Defective Cost or Pricing Data— Modifications	Oct 1997
52.215-12	Subcontractor Cost or Pricing Data	Oct 1997
52.215-13	Subcontractor Cost or Pricing Data—Modifications	Oct 1997
52.215-14	Integrity of Unit Prices (Alt 1)(Oct 1997)	Oct 1997
52.215-15	Pension Adjustments and Asset Reversions (Alt 1)(Oct 1997)	Oct 2004
52.215-18	Reversion or Adjustment of Plans for Postretirement Benefits (PRB) Other Than Pensions	Jul 2005
52.215-19	Notification of Ownership Changes	Oct 1997
52.215-20	Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data (Alt II)(Oct 1997)	Oct 1997
52.215-21	Requirements for Cost or Pricing Data or Information Other Than Cost or Pricing Data – Modifications (Alt II)(Oct 1997)	Oct 1997
52.216-7	Allowable Cost and Payment	Dec 2002
52.216-11	Cost Contract -- No Fee	Apr 1984
52.217-8	Option to Extend Services: Insert, 15 days before the expiration date of the contract.	Nov 1999
52.222-1	Notice To The Government Of Labor Disputes	Feb 1997
52.222-2	Payment For Overtime Premiums: Insert, <u>\$0 (CD)</u>	Jul 1990
52.222-19	Child Labor – Cooperation with Authorities and Remedies	Jan 2006
52.222-50	Combating Traffic in Persons	Apr 2006
52.223-5	Pollution Prevention and Right-to-Know Information (Alt 1)(Aug 2003)(Alt 2)(Aug 2003)	Aug 2003
52.223-9	Estimate of Percentage of Recovered Material Content for EPA Designated Products	Aug 2000
52.223-10	Waste Reduction Program	Aug 2000
52.225-8	Duty-Free Entry	Feb 2000
52.225-13	Restriction on Certain Foreign Purchases	Feb 2006
52.225-14	Inconsistency Between English Version and Translation of Contract	Feb 2000
52.227-1	Authorization and Consent	Jul 1995
52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement	Aug 1996
52.227-11	Patent Rights—Retention by the Contractor (Short Form)(Alt IV)(Dec 2007), as modified by NFS 1852.227-11	Dec 2007
52.227-16	Additional Data Requirements	Jun 1987
52.228-7	Insurance -- Liability to Third Persons	Mar 1996
52.229-7	Taxes – Fixed-Price Contracts with Foreign Governments: Insert: <u>Canada</u>	Jan 1991
52.229-9	Taxes-Cost-Reimbursement Contracts With Foreign Governments (Mar 1990): Insert, <u>Canada, Canada</u>	Mar 1990

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<u>Number</u>	<u>Title</u>	<u>Date</u>
52.230-2	Cost Accounting Standards	Apr 1998
52.230-6	Administration of Cost Accounting Standards	Apr 2005
52.232-1	Payments	Apr 1984
52.232-2	Payments Under Fixed-Price Research and Development Contracts	Apr 1984
52.232-8	Discounts for Prompt Payment	Feb 2002
52.232-9	Limitation Of Withholding Of Payments	Apr 1984
52.232-11	Extras	Apr 1984
52.232-22	Limitation Of Funds	Apr 1984
52.232-23	Assignment Of Claims	Jan 1986
52.232-25	Prompt Payment (Alt 1)(Feb 2002), <u>In paragraphs (a)(1)(i)(A) and (B)</u> , substitute “30th day” for “17th day”.	Oct 2003
52.232-32	Performance-Based Payments: Insert “30 th ”	Feb 2002
52.232-33	Payment by Electronic Funds Transfer--Central Contractor Registration	Oct 2003
52.233-3	Protest after Award (Alt 1)(Jun 1985)	Aug 1996
52.233-4	Applicable Law For Breach Of Contract Claim	Oct 2004
52.237-2	Protection of Government Buildings, Equipment, and Vegetation	Apr 1984
52.237-3	Continuity of Services	Jan 1991
52.239-1	Privacy or Security Safeguards	Aug 1996
52.242-1	Notice of Intent to Disallow Costs	Apr 1984
52.242-3	Penalties for Unallowable Costs	May 2001
52.242-13	Bankruptcy	Jul 1995
52.243-1	Changes -- Fixed-Price (Alt II)(Apr 1984)(Alt V)(Apr 1984)	Aug 1987
52.243-2	Changes -- Cost Reimbursement (Alt II)(Apr 1984) (Alt V)(Apr 1984)	Aug 1987
52.244-2	Subcontracts (Alt 1)(Jun 2007)	Jun 2007
52.244-5	Competition in Subcontracting	Dec 1996
52.244-6	Subcontracts for Commercial Items	Mar 1997
52.245-1	Government Property (Alt 1)(Jun 2007)	Jun 2007
52.245-9	Use and Charges	Jun 2007
52.246-24	Limitation Of Liability - High-Value Items (Alt 1)(1984)	Feb 1997
52.246-25	Limitation of Liability -- Services	Feb 1997
52.247-1	Commerical Bill of Lading Notations	Feb 2006
52.247-63	Preference for U.S.-Flag Air Carriers	Jun 2003
52.247-67	Submission of Transportation Documents for Audit	Feb 2006
52.248-1	Value Engineering	Feb 2000
52.249-2	Termination for Convenience of the Government (Fixed-Price)	May 2004
52.249-6	Termination (Cost-Reimbursement)(Alt II)(Sep 1996)	May 2004
<u>Number</u>	<u>Title</u>	<u>Date</u>

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52.249-8	Default (Fixed-Price Supply and Service)	Apr 1984
52.249-9	Default (Fixed-Price Research and Development)	Apr 1984
52.249-14	Excusable Delays	Apr 1984
52.253-1	Computer Generated Forms	Jan 1991

II. NASA Federal Acquisition Regulations Supplement (48 CFR Chapter 18)(Clauses)

<u>Number</u>	<u>Title</u>	<u>Date</u>
1852.215-84	Ombudsman, (Alt I)(Jun 2000): Insert, Lucy V. Kranz 2101 NASA Parkway, Houston, TX 77058 Phone: (281) 483-0490/Fax: (281) 483-2200	Oct 2003
1852.216-89	Assignment and Release Forms	Jul 1997
1852.223-74	Drug-and Alcohol-Free Workforce	Mar 1996
1852.228-75	Minimum Insurance Coverage	Oct 1988
1852.235-70	Center for AeroSpace Information	Dec 2006
1852.237-70	Emergency Evacuation	Dec 1988
1852.237-72	Access to Sensitive Information	Jun 2005
1852.237-73	Release of Sensitive Information	Jun 2005
1852.243-71	Shared Savings	Mar 1997

(End of Clause)

Full Text Clauses

I.2 Ordering (FAR 52.216-18)(Oct 1995)

(a) Any supplies and services to be furnished under this contract shall be ordered by issuance of delivery orders or task orders by the individuals or activities designated in the Schedule. Such orders may be issued from January 1, 2008 through September 30, 2010.

(b) All delivery orders or task orders are subject to the terms and conditions of this contract. In the event of conflict between a delivery order or task order and this contract, the contract shall control.

(c) If mailed, a delivery order or task order is considered "issued" when the Government deposits the order in the mail. Orders may be issued orally, by facsimile, or by electronic commerce methods only if authorized in the Schedule.

(End of Clause)

I.3 Order Limitations (FAR 52.216-19)(Oct 1995)

(a) Minimum order. When the Government requires supplies or services covered by this contract in an amount of less than \$5,000 CND, the Government is not obligated to purchase, nor is the Contractor obligated to furnish, those supplies or services under the contract.

(b) Maximum order. The Contractor is not obligated to honor-

- (1) Any order for a single item in excess of \$22,440,000 CND;
- (2) Any order for a combination of items in excess of \$22,440,000 CND; or
- (3) A series of orders from the same ordering office within 10 days that together call for quantities exceeding the limitation in subparagraph (b)(1) or (2) of this section.

(End of Clause)

I.4 Indefinite Quantity (FAR 52.216-22)(Oct 1995)

(a) This is an indefinite-quantity contract for the supplies or services specified, and effective for the period stated, in the Schedule. The quantities of supplies and services specified in the Schedule are estimates only and are not purchased by this contract.

(b) Delivery or performance shall be made only as authorized by orders issued in accordance with the Ordering clause. The Contractor shall furnish to the Government, when and if ordered, the supplies or services specified in the Schedule up to and including the quantity designated in the Schedule as the "maximum." The Government shall order at least the quantity of supplies or services designated in the Schedule as the "minimum."

(c) Except for any limitations on quantities in the Order Limitations clause or in the Schedule, there is no limit on the number of orders that may be issued. The Government may issue orders requiring delivery to multiple destinations or performance at multiple locations.

(d) Any order issued during the effective period of this contract and not completed within that period shall be completed by the Contractor within the time specified in the order. The contract shall govern the Contractor's and Government's rights and obligations with respect to that order to the same extent as if the order were completed during the contract's effective period; provided, that the Contractor shall not be required to make any deliveries under this contract after September 30, 2010.

(End of Clause)

I.5 Minimum Order For Total Contract

The minimum amount of combined task orders required for supplies or services covered by this contract is \$100,000 CND.

(End of Clause)

**I.6 Hazardous Material Identification and Material Safety Data
(FAR 52.223-3)(Jan 1997), (Alt I)(Jul 1995)**

- (a) *"Hazardous material,"* as used in this clause, includes any material defined as hazardous under the latest version of Federal Standard No. 313 (including revisions adopted during the term of the contract).
- (b) The offeror must list any hazardous material, as defined in paragraph (a) of this clause, to be delivered under this contract. The hazardous material shall be properly identified and include any applicable identification number, such as National Stock Number or Special Item Number. This information shall also be included on the Material Safety Data Sheet submitted under this contract.

Material	Identification No.
Flammable Solvents	
Isopropyl Alcohol	N/A
Methyl Ethyl Ketone (MEK)	N/A
Acetone	N/A
Xylene	N/A
Epoxy Polyamide Primer	N/A
Chemglaze Black Paint	Z306
Aeroglaze White Paint	A276
Nusil Clear RTV	CV1144-0
Tempo Yello/Orange Torque Paint	N/A
Nusil RTV Primer	SP 120
Varsol	N/A
Dow Corning Dry Lube Aerosol	321
Hazardous Materials – Structural Adhesives/Polymeric/Dry Lube	
Nusil CV	2566 RTV Parts A&B
Solithane	113/ Catalyst C330
Eccobond	57C Silver Epoxy Parts A&B
Hysol EA	934NA Parts A&B
Goodrich	1177 A/B

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Hysol RE	2038 /HD3475
Tungsten Disulphide Power Dry Lube	N/A

- (c) This list must be updated during performance of the contract whenever the Contractor determines that any other material to be delivered under this contract is hazardous.
- (d) The apparently successful offeror agrees to submit, for each item as required prior to award, a Material Safety Data Sheet, meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous material identified in paragraph (b) of this clause. Data shall be submitted in accordance with Federal Standard No. 313, whether or not the apparently successful offeror is the actual manufacturer of these items. Failure to submit the Material Safety Data Sheet prior to award may result in the apparently successful offeror being considered nonresponsible and ineligible for award.
- (e) If, after award, there is a change in the composition of the item(s) or a revision to Federal Standard No. 313, which renders incomplete or inaccurate the data submitted under paragraph (d) of this clause, the Contractor shall promptly notify the Contracting Officer and resubmit the data.
- (f) Neither the requirements of this clause nor any act or failure to act by the Government shall relieve the Contractor of any responsibility or liability for the safety of Government, Contractor, or subcontractor personnel or property.
- (g) Nothing contained in this clause shall relieve the Contractor from complying with applicable Federal, State, and local laws, codes, ordinances, and regulations (including the obtaining of licenses and permits) in connection with hazardous material.
- (h) The Government's rights in data furnished under this contract with respect to hazardous material are as follows:
- (1) To use, duplicate and disclose any data to which this clause is applicable. The purposes of this right are to --
 - (i) Apprise personnel of the hazards to which they may be exposed in using, handling, packaging, transporting, or disposing of hazardous materials;
 - (ii) Obtain medical treatment for those affected by the material; and
 - (iii) Have others use, duplicate, and disclose the data for the Government for these purposes.
 - (2) To use, duplicate, and disclose data furnished under this clause, in accordance with subparagraph (h)(1) of this clause, in precedence over any other clause of this contract providing for rights in data.
 - (3) The Government is not precluded from using similar or identical data acquired from other sources.

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(i) Except as provided in paragraph (i)(2), the Contractor shall prepare and submit a sufficient number of Material Safety Data Sheets (MSDSs), meeting the requirements of 29 CFR 1910.1200(g) and the latest version of Federal Standard No. 313, for all hazardous materials identified in paragraph (b) of this clause.

(1) For items shipped to consignees, the Contractor shall include a copy of the MSDS's with the packing list or other suitable shipping document which accompanies each shipment. Alternatively, the Contractor is permitted to transmit MSDSs to consignees in advance of receipt of shipments by consignees, if authorized in writing by the Contracting Officer.

(2) For items shipped to consignees identified by mailing address as agency depots, distribution centers or customer supply centers, the Contractor shall provide one copy of the MSDS's in or on each shipping container. If affixed to the outside of each container, the MSDS's must be placed in a weather resistant envelope.

(End of Clause)

I.7 Rights in Data -- General (FAR 52.227-14)(Dec 2007), (Alt I)(Dec 2007), (Alt III)(Dec 2007), as modified by NASA FAR Supplement 1852.227-14

(a) *Definitions.* As used in this clause—

“Computer database” or “database means” a collection of recorded information in a form capable of, and for the purpose of, being stored in, processed, and operated on by a computer. The term does not include computer software.

“Computer software”—

(1) Means

(i) Computer programs that comprise a series of instructions, rules, routines, or statements, regardless of the media in which recorded, that allow or cause a computer to perform a specific operation or series of operations; and

(ii) Recorded information comprising source code listings, design details, algorithms, processes, flow charts, formulas, and related material that would enable the computer program to be produced, created, or compiled.

(2) Does not include computer databases or computer software documentation.

“Computer software documentation” means owner’s manuals, user’s manuals, installation instructions, operating instructions, and other similar items, regardless of storage medium, that explain the capabilities of the computer software or provide instructions for using the software.

“Data” means recorded information, regardless of form or the media on which it may be recorded. The term includes technical data and computer software. The term does not include information incidental to contract administration, such as financial, administrative, cost or pricing, or management information.

“Form, fit, and function data” means data relating to items, components, or processes that are sufficient to enable physical and functional interchangeability, and data identifying source, size, configuration, mating and attachment characteristics, functional characteristics, and performance requirements. For computer software it means data

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identifying source, functional characteristics, and performance requirements but specifically excludes the source code, algorithms, processes, formulas, and flow charts of the software.

“Limited rights” means the rights of the Government in limited rights data as set forth in the Limited Rights Notice of paragraph (g)(3) if included in this clause.

“Limited rights data” means data, other than computer software, developed at private expense that embody trade secrets or are commercial or financial and confidential or privileged.

“Restricted computer software” means computer software developed at private expense and that is a trade secret, is commercial or financial and confidential or privileged, or is copyrighted computer software, including minor modifications of the computer software.

“Restricted rights,” as used in this clause, means the rights of the Government in restricted computer software, as set forth in a Restricted Rights Notice of paragraph (g) if included in this clause, or as otherwise may be provided in a collateral agreement incorporated in and made part of this contract, including minor modifications of such computer software.

“Technical data” means recorded information (regardless of the form or method of the recording) of a scientific or technical nature (including computer databases and computer software documentation). This term does not include computer software or financial, administrative, cost or pricing, or management data or other information incidental to contract administration. The term includes recorded information of a scientific or technical nature that is included in computer databases (See 41 U.S.C. 403(8)).

“Unlimited rights” means the rights of the Government to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so.

(b) Allocation of rights.

(1) Except as provided in paragraph (c) of this clause, the Government shall have unlimited rights in—

(i) Data first produced in the performance of this contract;
(ii) Form, fit, and function data delivered under this contract;
(iii) Data delivered under this contract (except for restricted computer software) that constitute manuals or instructional and training material for installation, operation, or routine maintenance and repair of items, components, or processes delivered or furnished for use under this contract; and

(iv) All other data delivered under this contract unless provided otherwise for limited rights data or restricted computer software in accordance with paragraph (g) of this clause.

(2) The Contractor shall have the right to—

(i) Assert copyright in data first produced in the performance of this contract to the extent provided in paragraph (c)(1) of this clause;

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(ii) Use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, unless provided otherwise in paragraph (d) of this clause;

(iii) Substantiate the use of, add, or correct limited rights, restricted rights, or copyright notices and to take other appropriate action, in accordance with paragraphs (e) and (f) of this clause; and

(iv) Protect from unauthorized disclosure and use those data that are limited rights data or restricted computer software to the extent provided in paragraph (g) of this clause.

(c) Copyright—

(1) Data first produced in the performance of this contract.

(i) Unless provided otherwise in paragraph (d) of this clause, the Contractor may, without prior approval of the Contracting Officer, assert copyright in scientific and technical articles based on or containing data first produced in the performance of this contract and published in academic, technical or professional journals, symposia proceedings, or similar works. The prior, express written permission of the Contracting Officer is required to assert copyright in all other data first produced in the performance of this contract.

(ii) When authorized to assert copyright to the data, the Contractor shall affix the applicable copyright notices of 17 U.S.C. 401 or 402, and an acknowledgment of Government sponsorship (including contract number).

(iii) For data other than computer software, the Contractor grants to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license in such copyrighted data to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly by or on behalf of the Government. For computer software, the Contractor grants to the Government, and others acting on its behalf, a paid-up, nonexclusive, irrevocable, worldwide license in such copyrighted computer software to reproduce, prepare derivative works, and perform publicly and display publicly (but not to distribute copies to the public) by or on behalf of the Government.

(2) *Data not first produced in the performance of this contract.* The Contractor shall not, without the prior written permission of the Contracting Officer, incorporate in data delivered under this contract any data not first produced in the performance of this contract unless the Contractor—

(i) Identifies the data; and

(ii) Grants to the Government, or acquires on its behalf, a license of the same scope as set forth in paragraph (c)(1) of this clause or, if such data are restricted computer software, the Government shall acquire a copyright license as set forth in paragraph (g)(4) of this clause (if included in this contract) or as otherwise provided in a collateral agreement incorporated in or made part of this contract.

(3) *Removal of copyright notices.* The Government will not remove any authorized copyright notices placed on data pursuant to this paragraph (c), and will include such notices on all reproductions of the data.

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(d) *Release, publication, and use of data.* The Contractor shall have the right to use, release to others, reproduce, distribute, or publish any data first produced or specifically used by the Contractor in the performance of this contract, except—

(1) As prohibited by Federal law or regulation (*e.g.*, export control or national security laws or regulations);

(2) As expressly set forth in this contract; or

(3) If the Contractor receives or is given access to data necessary for the performance of this contract that contain restrictive markings, the Contractor shall treat the data in accordance with such markings unless specifically authorized otherwise in writing by the Contracting Officer.

(4) (i) The Contractor agrees not to establish claim to copyright, publish or release to others any computer software first produced in the performance of this contract without the Contracting Officer's prior written permission.

(ii) If the Government desires to obtain copyright in computer software first produced in the performance of this contract and permission has not been granted as set forth in paragraph (d)(3)(i) of this clause, the Contracting Officer may direct the contractor to assert, or authorize the assertion of, claim to copyright in such data and to assign, or obtain the assignment of, such copyright to the Government or its designated assignee.

(iii) Whenever the word "establish" is used in this clause, with reference to a claim to copyright, it shall be construed to mean "assert".

(e) Unauthorized marking of data.

(1) Notwithstanding any other provisions of this contract concerning inspection or acceptance, if any data delivered under this contract are marked with the notices specified in paragraph (g)(3) or (g) (4) if included in this clause, and use of the notices is not authorized by this clause, or if the data bears any other restrictive or limiting markings not authorized by this contract, the Contracting Officer may at any time either return the data to the Contractor, or cancel or ignore the markings. However, pursuant to 41 U.S.C. 253d, the following procedures shall apply prior to canceling or ignoring the markings.

(i) The Contracting Officer will make written inquiry to the Contractor affording the Contractor 60 days from receipt of the inquiry to provide written justification to substantiate the propriety of the markings;

(ii) If the Contractor fails to respond or fails to provide written justification to substantiate the propriety of the markings within the 60-day period (or a longer time approved in writing by the Contracting Officer for good cause shown), the Government shall have the right to cancel or ignore the markings at any time after said period and the data will no longer be made subject to any disclosure prohibitions.

(iii) If the Contractor provides written justification to substantiate the propriety of the markings within the period set in paragraph (e)(1)(i) of this clause, the Contracting Officer will consider such written justification and determine whether or not the markings are to be cancelled or ignored. If the Contracting Officer determines that the markings are authorized, the Contractor will be so notified in writing. If the Contracting Officer determines, with concurrence of the head of the contracting activity,

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that the markings are not authorized, the Contracting Officer will furnish the Contractor a written determination, which determination will become the final agency decision regarding the appropriateness of the markings unless the Contractor files suit in a court of competent jurisdiction within 90 days of receipt of the Contracting Officer's decision. The Government will continue to abide by the markings under this paragraph (e)(1)(iii) until final resolution of the matter either by the Contracting Officer's determination becoming final (in which instance the Government will thereafter have the right to cancel or ignore the markings at any time and the data will no longer be made subject to any disclosure prohibitions), or by final disposition of the matter by court decision if suit is filed.

(2) The time limits in the procedures set forth in paragraph (e)(1) of this clause may be modified in accordance with agency regulations implementing the Freedom of Information Act (5 U.S.C. 552) if necessary to respond to a request thereunder.

(3) Except to the extent the Government's action occurs as the result of final disposition of the matter by a court of competent jurisdiction, the Contractor is not precluded by paragraph (e) of the clause from bringing a claim, in accordance with the Disputes clause of this contract, that may arise as the result of the Government removing or ignoring authorized markings on data delivered under this contract.

(f) Omitted or incorrect markings.

(1) Data delivered to the Government without any restrictive markings shall be deemed to have been furnished with unlimited rights. The Government is not liable for the disclosure, use, or reproduction of such data.

(2) If the unmarked data has not been disclosed without restriction outside the Government, the Contractor may request, within 6 months (or a longer time approved by the Contracting Officer in writing for good cause shown) after delivery of the data, permission to have authorized notices placed on the data at the Contractor's expense. The Contracting Officer may agree to do so if the Contractor—

- (i) Identifies the data to which the omitted notice is to be applied;
- (ii) Demonstrates that the omission of the notice was inadvertent;
- (iii) Establishes that the proposed notice is authorized; and
- (iv) Acknowledges that the Government has no liability for the

disclosure, use, or reproduction of any data made prior to the addition of the notice or resulting from the omission of the notice.

(3) If data has been marked with an incorrect notice, the Contracting Officer may—

- (i) Permit correction of the notice at the Contractor's expense if the Contractor identifies the data and demonstrates that the correct notice is authorized; or
- (ii) Correct any incorrect notices.

(g) Protection of limited rights data and restricted computer software.

(1) The Contractor may withhold from delivery qualifying limited rights data or restricted computer software that are not data identified in paragraphs (b)(1)(i), (ii), and (iii) of this clause. As a condition to this withholding, the Contractor shall—

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- (i) Identify the data being withheld; and
 - (ii) Furnish form, fit, and function data instead.
- (2) Limited rights data that are formatted as a computer database for delivery to the Government shall be treated as limited rights data and not restricted computer software.

(3) [Reserved]

(4) (i) Notwithstanding paragraph (g)(1) of this clause, the contract may identify and specify the delivery of restricted computer software, or the Contracting Officer may require by written request the delivery of restricted computer software that has been withheld or would otherwise be entitled to be withheld. If delivery of that computer software is required, the Contractor shall affix the following "Restricted Rights Notice" to the computer software and the Government will treat the computer software, subject to paragraphs (e) and (f) of this clause, in accordance with the notice:

Restricted Rights Notice (Dec 2007)

(a) This computer software is submitted with restricted rights under Government Contract No. NNJ08GA03C (and subcontract _____, if appropriate). It may not be used, reproduced, or disclosed by the Government except as provided in paragraph (b) of this notice or as otherwise expressly stated in the contract.

- (b) This computer software may be—
- (1) Used or copied for use with the computer(s) for which it was acquired, including use at any Government installation to which the computer(s) may be transferred;
 - (2) Used or copied for use with a backup computer if any computer for which it was acquired is inoperative;
 - (3) Reproduced for safekeeping (archives) or backup purposes;
 - (4) Modified, adapted, or combined with other computer software, *provided* that the modified, adapted, or combined portions of the derivative software incorporating any of the delivered, restricted computer software shall be subject to the same restricted rights;
 - (5) Disclosed to and reproduced for use by support service Contractors or their subcontractors in accordance with paragraphs (b)(1) through (4) of this notice; and
 - (6) Used or copied for use with a replacement computer.

(c) Notwithstanding the foregoing, if this computer software is copyrighted computer software, it is licensed to the Government with the minimum rights set forth in paragraph (b) of this notice.

(d) Any other rights or limitations regarding the use, duplication, or disclosure of this computer software are to be expressly stated in, or incorporated in, the contract.

(e) This notice shall be marked on any reproduction of this computer software, in whole or in part.

(End of notice)

(ii) Where it is impractical to include the Restricted Rights Notice on restricted computer software, the following short-form notice may be used instead:

Restricted Rights Notice Short Form (Jun 1987)

Use, reproduction, or disclosure is subject to restrictions set forth in Contract No. NNJ08GA03C (and subcontract, if appropriate) with the Canadian Commercial Corporation (CCC) and MacDonald Dettwiler & Associates (MDA)

(End of notice)

(iii) If restricted computer software is delivered with the copyright notice of 17 U.S.C. 401, it will be presumed to be licensed to the Government without disclosure prohibitions, with the minimum rights set forth in paragraph (b) of this clause.

(h) *Subcontracting.* The Contractor shall obtain from its subcontractors all data and rights therein necessary to fulfill the Contractor's obligations to the Government under this contract. If a subcontractor refuses to accept terms affording the Government those rights, the Contractor shall promptly notify the Contracting Officer of the refusal and shall not proceed with the subcontract award without authorization in writing from the Contracting Officer.

(i) *Relationship to patents or other rights.* Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government.

(End of Clause)

I.8 Notification of Changes (FAR 52.243-7)(Apr 1984)

(a) *Definitions.* "Contracting Officer," as used in this clause, does not include any representative of the Contracting Officer. "Specifically Authorized Representative (SAR)," as used in this clause, means any person the Contracting Officer has so designated by written notice (a copy of which shall be provided to the Contractor) which shall refer to this subparagraph and shall be issued to the designated representative before the SAR exercises such authority.

(b) *Notice.* The primary purpose of this clause is to obtain prompt reporting of Government conduct that the Contractor considers to constitute a change to this contract. Except for changes identified as such in writing and signed by the Contracting Officer, the Contractor shall notify the Administrative Contracting Officer in writing promptly, within 7 calendar days from the date that the Contractor identifies any Government conduct (including actions, inactions, and written or oral communications) that the Contractor regards as a change to the contract terms and conditions. On the basis of the most accurate information available to the Contractor, the notice shall state –

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- (1) The date, nature, and circumstances of the conduct regarded as a change;
 - (2) The name, function, and activity of each Government individual and Contractor official or employee involved in or knowledgeable about such conduct;
 - (3) The identification of any documents and the substance of any oral communication involved in such conduct;
 - (4) In the instance of alleged acceleration of scheduled performance or delivery, the basis upon which it arose;
 - (5) The particular elements of contract performance for which the Contractor may seek an equitable adjustment under this clause, including --
 - (i) What contract line items have been or may be affected by the alleged change;
 - (ii) What labor or materials or both have been or may be added, deleted, or wasted by the alleged change;
 - (iii) To the extent practicable, what delay and disruption in the manner and sequence of performance and effect on continued performance have been or may be caused by the alleged change;
 - (iv) What adjustments to contract price, delivery schedule, and other provisions affected by the alleged change are estimated; and
 - (6) The Contractor's estimate of the time by which the Government must respond to the Contractor's notice to minimize cost, delay or disruption of performance.
- (c) Continued performance. Following submission of the notice required by paragraph (b) of this clause, the Contractor shall diligently continue performance of this contract to the maximum extent possible in accordance with its terms and conditions as construed by the Contractor, unless the notice reports a direction of the Contracting Officer or a communication from a SAR of the Contracting Officer, in either of which events the Contractor shall continue performance; provided, however, that if the Contractor regards the direction or communication as a change as described in paragraph (b) of this clause, notice shall be given in the manner provided. All directions, communications, interpretations, orders and similar actions of the SAR shall be reduced to writing promptly and copies furnished to the Contractor and to the Contracting Officer. The Contracting Officer shall promptly countermand any action which exceeds the authority of the SAR.
- (d) Government response. The Contracting Officer shall promptly, within 7 calendar days after receipt of notice, respond to the notice in writing. In responding, the Contracting Officer shall either --
- (1) Confirm that the conduct of which the Contractor gave notice constitutes a change and when necessary direct the mode of further performance;
 - (2) Countermand any communication regarded as a change;
 - (3) Deny that the conduct of which the Contractor gave notice constitutes a change and when necessary direct the mode of further performance; or
 - (4) In the event the Contractor's notice information is inadequate to make a decision under subparagraphs (d)(1), (2), or (3) of this clause, advise the Contractor what

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additional information is required, and establish the date by which it should be furnished and the date thereafter by which the Government will respond.

(e) Equitable adjustments.

(1) If the Contracting Officer confirms that Government conduct effected a change as alleged by the Contractor, and the conduct causes an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under this contract, whether changed or not changed by such conduct, an equitable adjustment shall be made --

- (i) In the contract price or delivery schedule or both; and
- (ii) In such other provisions of the contract as may be affected.

(2) The contract shall be modified in writing accordingly. In the case of drawings, designs or specifications which are defective and for which the Government is responsible, the equitable adjustment shall include the cost and time extension for delay reasonably incurred by the Contractor in attempting to comply with the defective drawings, designs or specifications before the Contractor identified, or reasonably should have identified, such defect. When the cost of property made obsolete or excess as a result of a change confirmed by the Contracting Officer under this clause is included in the equitable adjustment, the Contracting Officer shall have the right to prescribe the manner of disposition of the property. The equitable adjustment shall not include increased costs or time extensions for delay resulting from the Contractor's failure to provide notice or to continue performance as provided, respectively, in paragraphs (b) and (c) of this clause.

NOTE: The phrases "contract price" and "cost" wherever they appear in the clause, may be appropriately modified to apply to cost-reimbursement or incentive contracts, or to combinations thereof.

(End of Clause)

I.9 Commercial Bill of Lading Notations (FAR 52.247-1)(Feb 2006)

When the Contracting Officer authorizes supplies to be shipped on a commercial bill of lading and the Contractor will be reimbursed these transportation costs as direct allowable costs, the Contractor shall ensure before shipment is made that the commercial shipping documents are annotated with either of the following notations, as appropriate:

(a) If the Government is shown as the consignor or the consignee, the annotation shall be:

Transportation is for the NASA/Lyndon B. Johnson Space Center and the actual total transportation charges paid to the carrier(s) by the consignor or consignee are assignable to, and shall be reimbursed by, the Government.

(b) If the Government is not shown as the consignor or the consignee, the annotation shall be:

Transportation is for the NASA/Lyndon B. Johnson Space Center and the actual total transportation charges paid to the carrier(s) by the consignor or

consignee shall be reimbursed by the Government, pursuant to cost-reimbursement contract No. NNJ08GA03C. This may be confirmed by contacting:

NASA/Lyndon B. Johnson Space Center
BV/Shuttle Procurement Office
Attention: Contracting Officer
2101 NASA Parkway
Houston Texas, 77058

(End of Clause)

I.10 Duty-Free Entry of Space Articles (NFS 1852.225-8)

As prescribed in 1825.1101(e), add the following paragraph (k) to the basic clause at FAR 52.225-8: (k) The following supplies will be given duty-free entry: Supplies defined in the statement of work, and government issued task orders.

(End of Addition)

I.11 Security Requirements for Unclassified Information Technology Resources (NFS 1852.204-76)(May 2008)

(a) The Contractor shall be responsible for information and information technology (IT) security when –

(1) The Contractor or its subcontractors must obtain physical or electronic (i.e., authentication level 2 and above as defined in National Institute of Standards and Technology (NIST) Special Publication (SP) 800-63, Electronic Authentication Guideline) access to NASA's computer systems, networks, or IT infrastructure; or

(2) Information categorized as low, moderate, or high by the Federal Information Processing Standards (FIPS) 199, Standards for Security Categorization of Federal Information and Information Systems is stored, generated, processed, or exchanged by NASA or on behalf of NASA by a contractor or subcontractor, regardless of whether the information resides on a NASA or a contractor/subcontractor's information system.

(b) IT Security Requirements.

(1) Within 30 days after contract award, a Contractor shall submit to the Contracting Officer for NASA approval an IT Security Plan, Risk Assessment, and FIPS 199, Standards for Security Categorization of Federal Information and Information Systems, Assessment. These plans and assessments, including annual updates shall be incorporated into the contract as compliance documents.

(i) The IT system security plan shall be prepared consistent, in form and content, with NIST SP 800-18, Guide for Developing Security Plans for Federal Information Systems, and any additions/augmentations described in NASA Procedural Requirements (NPR) 2810, Security of Information Technology. The security plan shall

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identify and document appropriate IT security controls consistent with the sensitivity of the information and the requirements of Federal Information Processing Standards (FIPS) 200, Recommended Security Controls for Federal Information Systems. The plan shall be reviewed and updated in accordance with NIST SP 800-26, Security Self-Assessment Guide for Information Technology Systems, and FIPS 200, on a yearly basis.

(ii) The risk assessment shall be prepared consistent, in form and content, with NIST SP 800-30, Risk Management Guide for Information Technology Systems, and any additions/augmentations described in NPR 2810. The risk assessment shall be updated on a yearly basis.

(iii) The FIPS 199 assessment shall identify all information types as well as the “high water mark,” as defined in FIPS 199, of the processed, stored, or transmitted information necessary to fulfill the contractual requirements.

(2) The Contractor shall produce contingency plans consistent, in form and content, with NIST SP 800-34, Contingency Planning Guide for Information Technology Systems, and any additions/augmentations described in NPR 2810. The Contractor shall perform yearly “Classroom Exercises.” “Functional Exercises,” shall be coordinated with the Center CIOs and be conducted once every three years, with the first conducted within the first two years of contract award. These exercises are defined and described in NIST SP 800-34.

(3) The Contractor shall ensure coordination of its incident response team with the NASA Incident Response Center (NASIRC) and the NASA Security Operations Center, ensuring that incidents are reported consistent with NIST SP 800-61, Computer Security Incident Reporting Guide, and the United States Computer Emergency Readiness Team’s (US-CERT) Concept of Operations for reporting security incidents. Specifically, any confirmed incident of a system containing NASA data or controlling NASA assets shall be reported to NASIRC within one hour that results in unauthorized access, loss or modification of NASA data, or denial of service affecting the availability of NASA data.

(4) The Contractor shall ensure that its employees, in performance of the contract, receive annual IT security training in NASA IT Security policies, procedures, computer ethics, and best practices in accordance with NPR 2810 requirements. The Contractor may use web-based training available from NASA to meet this requirement.

(5) The Contractor shall provide NASA, including the NASA Office of Inspector General, access to the Contractor’s and subcontractors’ facilities, installations, operations, documentation, databases, and personnel used in performance of the contract. Access shall be provided to the extent required to carry out IT security inspection, investigation, and/or audits to safeguard against threats and hazards to the integrity, availability, and confidentiality of NASA information or to the function of computer systems operated on behalf of NASA, and to preserve evidence of computer crime. To facilitate mandatory reviews, the Contractor shall ensure appropriate compartmentalization of NASA information, stored and/or processed, either by information systems in direct support of the contract or that are incidental to the contract.

(6) The Contractor shall ensure that system administrators who perform tasks that have a material impact on IT security and operations demonstrate knowledge appropriate to those tasks. ~~Knowledge is demonstrated through the NASA System Administrator Security Certification Program.~~ A system administrator is one who

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provides IT services (including network services, file storage, and/or web services) to someone other than themselves and takes or assumes the responsibility for the security and administrative controls of that service. ~~Within 30 days after contract award, the Contractor shall provide to the Contracting Officer a list of all system administrator positions and personnel filling those positions, along with a schedule that ensures certification of all personnel within 90 days after contract award. Additionally, the Contractor should report all personnel changes which impact system administrator positions within 5 days of the personnel change and ensure these individuals obtain System Administrator certification within 90 days after the change.~~

(7) The Contractor shall ensure that NASA's Sensitive But Unclassified (SBU) information as defined in NPR 1600.1, NASA Security Program Procedural Requirements, which includes privacy information, is encrypted in storage and transmission.

(8) When the Contractor is located at a NASA Center or installation or is using NASA IP address space, the Contractor shall --

(i) Submit requests for non-NASA provided external Internet connections to the Contracting Officer for approval by the Network Security Configuration Control Board (NSCCB);

(ii) Comply with the NASA CIO metrics including patch management, operating systems and application configuration guidelines, vulnerability scanning, incident reporting, system administrator certification, and security training; and

(iii) Utilize the NASA Public Key Infrastructure (PKI) for all encrypted communication or non-repudiation requirements within NASA when secure email capability is required.

(c) Physical and Logical Access Requirements.

(1) Contractor personnel requiring access to IT systems operated by the Contractor for NASA or interconnected to a NASA network shall be screened at an appropriate level in accordance with NPR 2810 and Chapter 4, NPR 1600.1, NASA Security Program Procedural Requirements. NASA shall provide screening, appropriate to the highest risk level, of the IT systems and information accessed, using, as a minimum, National Agency Check with Inquiries (NACI). The Contractor shall submit the required forms to the NASA Center Chief of Security (CCS) within fourteen (14) days after contract award or assignment of an individual to a position requiring screening. The forms may be obtained from the CCS. At the option of NASA, interim access may be granted pending completion of the required investigation and final access determination. For Contractors who will reside on a NASA Center or installation, the security screening required for all required access (e.g., installation, facility, IT, information, etc.) is consolidated to ensure only one investigation is conducted based on the highest risk level. Contractors not residing on a NASA installation will be screened based on their IT access risk level determination only. See NPR 1600.1, Chapter 4.

(2) Guidance for selecting the appropriate level of screening is based on the risk of adverse impact to NASA missions. NASA defines three levels of risk for which screening is required (IT-1 has the highest level of risk).

(i) IT-1 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause very serious adverse impact to NASA

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missions. These systems include, for example, those that can transmit commands directly modifying the behavior of spacecraft, satellites or aircraft.

(ii) IT-2 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause serious adverse impact to NASA missions. These systems include, for example, those that can transmit commands directly modifying the behavior of payloads on spacecraft, satellites or aircraft; and those that contain the primary copy of "level 1" information whose cost to replace exceeds one million dollars.

(iii) IT-3 -- Individuals having privileged access or limited privileged access to systems whose misuse can cause significant adverse impact to NASA missions. These systems include, for example, those that interconnect with a NASA network in a way that exceeds access by the general public, such as bypassing firewalls; and systems operated by the Contractor for NASA whose function or information has substantial cost to replace, even if these systems are not interconnected with a NASA network.

(3) Screening for individuals shall employ forms appropriate for the level of risk as established in Chapter 4, NPR 1600.1.

(4) The Contractor may conduct its own screening of individuals requiring privileged access or limited privileged access provided the Contractor can demonstrate to the Contracting Officer that the procedures used by the Contractor are equivalent to NASA's personnel screening procedures for the risk level assigned for the IT position.

(5) Subject to approval of the Contracting Officer, the Contractor may forgo screening of Contractor personnel for those individuals who have proof of a --

(i) Current or recent national security clearances (within last three years);

(ii) Screening conducted by NASA within the last three years that meets or exceeds the screening requirements of the IT position; or

(iii) Screening conducted by the Contractor, within the last three years, that is equivalent to the NASA personnel screening procedures as approved by the Contracting Officer and concurred on by the CCS.

(d) The Contracting Officer may waive the requirements of paragraphs (b) and (c)(1) through (c)(3) upon request of the Contractor. The Contractor shall provide all relevant information requested by the Contracting Officer to support the waiver request.

(e) The Contractor shall contact the Contracting Officer for any documents, information, or forms necessary to comply with the requirements of this clause.

(f) At the completion of the contract, the contractor shall return all NASA information and IT resources provided to the contractor during the performance of the contract and certify that all NASA information has been purged from contractor-owned systems used in the performance of the contract.

(g) The Contractor shall insert this clause, including this paragraph (g), in all subcontracts

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- (1) Have physical or electronic access to NASA's computer systems, networks, or IT infrastructure; or
- (2) Use information systems to generate, store, process, or exchange data with NASA or on behalf of NASA, regardless of whether the data resides on a NASA or a contractor's information system.

(End of Clause)

**I.12 Engineering Change Proposals (NFS 1852.243-70)(Oct 2001)(Alt II)
(Sep 1990)**

- (a) Definitions. "ECP" means an Engineering Change Proposal (ECP) which is a proposed engineering change and the documentation by which the change is described, justified, and submitted to the procuring activity for approval or disapproval.
- (b) Either party to the contract may originate ECPs. Implementation of an approved ECP may occur by either a supplemental agreement or, if appropriate, as a written change order to the contract.
- (c) Any ECP submitted to the Contracting Officer shall include a "not-to-exceed" ___ [price or estimated cost] increase or decrease adjustment amount, if any, and the required [time of delivery or period of performance] adjustment, if any, acceptable to the originator of the ECP. If the change is originated within the Government, the Contracting Officer shall obtain a written agreement with the contractor regarding the "not-to-exceed" ___ [price or estimated cost] and [delivery or period of performance] adjustments, if any, prior to issuing an order for implementation of the change. An ECP accepted in accordance with the Changes clause of this contract shall not be considered an authorization to the Contractor to exceed the estimated cost in the contract Schedule, unless the estimated cost is increased by the change order or other contract modification.
- (d) After submission of a contractor initiated ECP, the contracting officer may require the contractor to submit the following information:
 - (1) Cost or pricing data in accordance with FAR 15.403-5 if the proposed change meets the criteria for its submission under FAR 15.403-4; or
 - (2) Information other than cost or pricing data adequate for contracting officer determination of price reasonableness or cost realism. The contracting officer reserves the right to request additional information if that provided by the contractor is considered inadequate for that purpose. If the contractor claims applicability of one of the exceptions to submission of cost or pricing data, it shall cite the exception and provide rationale for its applicability.
- (e) If the ECP is initiated by NASA, the contracting officer shall specify the cost information requirements, if any.

(End of Clause)

I.13 Security Controls For KSC and CCAFS (KSC 52.204-96)(Nov 2006)

(a) Identification of Employees

(1) Badging:

(i) Kennedy Space Center (KSC) badging is mandatory for all Contractor personnel (e.g. administrative, technical, Architect and Engineering, supervisory, construction crafts, etc.) who require access into KSC or Cape Canaveral Air Force Station (CCAFS). The contractor shall require each employee, and each subcontractor employee who require access to KSC or CCAFS to obtain identification badges, and special controlled area access badges, as necessary. Identification and badging of employees must be completed prior to issuance of a Notice to Proceed by the Contracting Officer, if applicable, or commencement of activities by unbadged employees.

(ii) Prior to proceeding with performance, the contractor shall submit the following information to the contracting officer, who will certify it and pass the information on to the Badging office:

- (A) Contract number and location of work site(s);
- (B) Contract commencement and completion dates;
- (C) Status as prime or subcontractor; and,
- (D) Name of the Contractor designated security/badging official.

(Designated badging officials must receive a badging briefing, identifying badging requirements/restrictions, prior to being authorized as badging officials.)

(iii) During performance of this contract, issued badges shall be worn by contractor employees and prominently displayed at all times while on KSC or CCAFS property, unless wearing the badge creates a safety hazard. Upon termination of an employee, or completion/termination of the contract, the contractor shall immediately deliver such employee's identification and access badge(s) to the Security Badging office, either at a Pass and Identification Station (PIDS) or in the Visitor Records Center, Room 1470, KSC Headquarters Building. NASA Identification badges remain the property of NASA and the Government reserves the right to invalidate/confiscate such badges at any time.

(iv) To ensure timely and efficient issuance of identification and special access badges to contractor personnel, immediately after contract award but prior to notice to proceed or work on-site, the contractor shall designate in writing to the Contracting Officer a security/badging official for the contract/contractor. Concurrently, the designated security/badging official shall submit to the Contracting Officer a KSC Form 20-162 (Request for KSC Picture Badge) for each employee requiring access to KSC or CCAFS. This is the minimum paperwork required for each employee (and subcontractor employee) for issuance of identification badges only.

(2) Homeland Security Presidential Directive (HSPD) 12, Federal Information Processing Standards (FIPS) Publication 201, and Office of Management and Budget (OMB) Guidance M-05-24 Compliance:

(i) In compliance with Homeland Security Presidential Directive (HSPD) 12, Federal Information Processing Standards (FIPS) Publication 201, and Office of Management and Budget (OMB) Guidance M-05-24, all persons who will have access to government controlled facilities or access to a Federal information system for a period of in

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excess of 180 days must have a favorably completed National Agency Check with Written Inquiries (NACI). To accomplish this, the forms listed below need to be submitted to the Personnel Security Support Office, Room 1503, KSC Headquarters Building. FIPS Pub 201 requires identification verification be accomplished by the applicant (person to be badged) providing two items of identification listed in Department of Homeland Security (DHS) Form I-9.

- (A) KSC Form 20 – 87, NASA PRP Investigation and Qualification Data Request;
 - (B) FD Form 258, Fingerprint Card
 - (C) Standard Form 85, Questionnaire for Non-Sensitive Positions;
- and,
- (D) Optional Form 306, Declaration for Federal Position Employment.

(b) Badging Restrictions/Categories:

(1) White Temporary Pass (WTP). Under current KSC security restrictions, an “Unescorted” White Temporary Pass (WTP) is required for unescorted entry through the KSC perimeter gates. (Permanent picture badges are no longer required.) The Contractor’s designated security/badging official is authorized to request issuance of WTPs (or consent to retain existing WTPs) for those individuals that he/she can “vouch” for, based upon verification of U.S. citizenship and demonstrated work history. The contractor security/badging official is responsible for ensuring the integrity of this system, will be held accountable for issuance of a WTP to any unauthorized individual, and is responsible for the behavior of anyone for whom s/he authorizes a badge.

(2) Pink Temporary Pass (PTP). Any individual for whom the designated security/badging official cannot “vouch” in accordance with the above criteria will be issued a “To Be Escorted” Pink Temporary Pass (PTP). All persons with PTPs, including vendors, must be signed in at the perimeter gate and escorted to and from the job site. The escort must maintain visual contact with their escortee(s) at all times and shall escort them off KSC property at the conclusion of their on-site work.

(3) Green Temporary Pass (GTP). Persons who are not a United States citizen or are an employee of a foreign government, company, or other foreign entity must be so identified by being issued a green temporary pass. Each such employee must obtain individual prior approval for entry from the KSC International Visits Coordinator (IVC) in the NASA Protective Services Office (TA-G).

(c) Access to Controlled Areas within KSC.

(1) Certain areas within KSC have been designated as Controlled Areas. These are normally surrounded by fencing and have an entrance gate monitored by a security officer or a monitoring device. Access into such areas is classified as either “escorted” or “unescorted” access. For unescorted access into these areas, for each employee, the contractor must submit to the Contracting Officer’s Technical Representative (COTR), in addition to the NACI forms listed above in paragraph A.3.a-d, a NASA Form 1730, Request for Unescorted Access/Personnel Reliability Program.

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(2) The NASA Protective Services Office, or its designee, the Personnel Security Support Office (PSSO), will determine whether the person is eligible for unescorted access within 14 working days after the receipt of the properly completed forms and so inform the COTR. The COTR will notify the contractor of the NASA Protective Services Office's approval/disapproval. Access to controlled areas is granted when the requisite safety training has been successfully completed.

(3) All contractor employees utilized on the job site will not require unescorted access. However, it is the contractor's responsibility to designate and submit the required information on a sufficient number to provide escort service to those not cleared for unescorted access. The contractor escort will be required to meet the work crew at the security area gate at the beginning of the Contractor's workday/shift and escort them as a group to the job site. The escort will keep the crews within site until they are escorted back to the area gate at the end of the workday. No authorized personnel will leave the immediate work area without an appropriately badged escort.

(4) The Government will provide, at no cost to the contractor, investigative services for a designated number of employees/workers escorts. If, through attrition or personnel turnover, the contractor requires additional employees to be investigated for unescorted access, the contract price shall be reduced by \$100.00 per person in excess of the designated number. If, because of varying mobilization approaches, the contractor desires unescorted access for more than the stated quantity, the contractor may request additional clearances at a reduction in contract price of \$100.00 per person.

(5) The prime contractor is responsible for providing escort services for any of his employees and/or any subcontractor employees who are not eligible for unescorted access. The Government will not provide escort service under this contract. The contractor shall be responsible for all delays and costs caused by its failure to provide for unescorted access. All requests for unescorted access by subcontractors will be submitted through the prime contractor to the COTR for processing by the NASA Protective Services Office, or its designee, the PSSO.

(6) One or more on-site training classes may be required for admittance to the work area and for inclusion on the Job Site Access List for Controlled-access Areas. The total training will not exceed four hours. Contractors may schedule any required training for their employees by contacting the COTR. The Contractor shall maintain a record of employees receiving the training.

(i) This project is to be performed in a limited access area. The designated number of employees for whom interim unescorted access investigations will be performed at no cost to the contractor is 3.

(End of Clause)

[End of Section]

PART III – LIST OF DOCUMENTS, EXHIBITS, AND OTHER ATTACHMENTS

Section J - List of Attachments

Attachment	Title
J-1	End of Program Fee Plan
J-2	Canadian Commercial Corporation (CCC) Fixed Rates
J-3	Data Requirements List
J-4	Data Requirements Descriptions
J-5	Government Property
J-6	Advance Agreement on Severance Payments
J-7	Safety and Health Plan

**Attachment J-1
End of Program Fee Plan**

(a) End of Program (EOP) Fee

(1) The purpose of the EOP Fee is to motivate the contractor to maintain the appropriate level of skills and resources to safely complete the program objectives.

(2) EOP Fee will be made available upon the end of mission execution. For the purposes of this plan, mission execution is defined as the completion of down-mission processing following the last shuttle flight. The contractor will submit a letter notifying the Contracting Officer of the end of mission execution. In the event that a manifest change moves the end of mission execution to a date beyond FY2010, the contractor will be evaluated and an EOP fee determination issued for settlement of the EOP fee pool, at the conclusion of the basic period of performance of the contract. The Contracting Officer will provide written concurrence, or non-concurrence along with supporting rationale, within 15 days of receipt of the Contractors letter.

(3) A determination of the performance score and the related dollars earned for the EOP Fee will be made by the Fee Determining Official (FDO) not later than 45 days after the end of the mission execution. The FDO is the Assistant Manager for the Orbiter Project Office. A contract modification recognizing the dollars earned will be issued within 15 days after the FDO determination. Best efforts will be made to issue the contract modification within CY 2010. The EOP Fee is subject to the scoring system delineated in Table A – End of Program Fee Scoring System. The available EOP Fee dollars are stated in paragraph (c) of B.2(d), Contract Value. The EOP Fee is subject to provisional billing. Pending a determination of the amount of EOP fee earned, a portion of the available EOP fee for a period will be provisionally paid to the contractor on a monthly basis. The provisional payment shall never exceed 60%. Procedures to be followed in monitoring, assessing, and evaluating contractor performance are described below.

(4) The contractor may furnish a self-evaluation report within 10 calendar days after the conclusion of the mission execution. This self-evaluation report shall not exceed 20 pages in length. The Orbiter Project Office will not submit its recommendation to the FDO until (1) the contractor's self-evaluation report has been received and considered, or (2) the contractor has provided written notification that a self-evaluation report will not be submitted, or (3) the 10-day period provided for submission of the report has expired.

(5) At the end of mission execution, the Orbiter Project Office shall meet to consider all of the performance information it has obtained. The Orbiter Project Office will prepare a written EOP Report documenting its evaluation, which shall include recommendations for an adjective rating and numerical score to be assigned to the contractor's performance in meeting the EOP Fee objectives. This report and a presentation will be provided to the FDO. The contractor shall have the opportunity to make a presentation to the FDO if they so desire.

(6) The contractor may choose to make a presentation to the Orbiter Project Office. If the contractor chooses to make a presentation, notification must be made to the Contracting Officer no later than 15 working days after the end of mission execution. The presentation, if provided, will be limited to one hour in length.

(7) The FDO will consider the recommendations of the following sources in determining the performance score: (1) Orbiter Project Office; (2) information provided by the

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contractor; and (3) any other pertinent information. The FDO's determination of the scores will be stated in a written EOP Fee Determination (EFD).

(8) The contractor will be notified by the Contracting Officer of the FDO performance score, and will be provided the EOP Report. The contractor may provide additional information for consideration by the FDO by notifying the Contracting Officer of its desire to do so. This is an opportunity for the contractor to provide any information which the contractor believes is relevant to its performance and which may affect the FDO's determination. Any additional information should be provided to the Contracting Officer within 5 calendar days of contractor receipt of the FDO adjectival rating, numerical score, and EOP Report. This additional contractor information will be provided to the FDO by the Contracting Officer through the COTR.

(9) The EFD will be provided to the contractor by the Contracting Officer. The contractor may, after notification of the determination, request, through the Contracting Officer, a briefing by the COTR. This briefing shall be conducted no later than 14 days following the written request by the contractor.

(10) FAR 52.232-32, Performance-Based Payments is not applicable to this Attachment J-1.

(b) Evaluation Factors

(1) NASA will evaluate the contractor on its performance in meeting the EOP Fee objectives. Actions taken by the Contractor to reduce costs to comply with NASA funding limitations shall be taken into consideration in this evaluation. Evaluation factors include:

(i) The contractor's performance in the retention of critical skills and capabilities to ensure sustainability based on criteria mutually agreed upon by the Contracting Officer's Technical Representative and the contractor's Program Manager.

(ii) The contractor's performance in transition and closeout work, to the extent authorized and funded.

(iii) The contractor's performance in sustaining assets and infrastructure to safely complete the manifest based on criteria mutually agreed upon by the COTR and the contractor's Program Manager.

(iv) The contractor's performance in maintaining a proper balance between spares to support fly-out of the Program and end of Program inventory based on criteria mutually agreed upon by the Contracting Officer's Technical Representative and the contractor's Program Manager.

(v) The contractor's performance in managing the balance of workforce levels for accomplishment of required work and the best efforts outplacement of personnel in concert with Program closeout, based on criteria mutually agreed upon by the COTR and the contractor's Program Manager.

(vi) The contractor's performance in avoiding impacts which would preclude the completion of a seventeen flight manifest.

(vii) The contractor's performance in controlling costs to avoid overrun situations. Cost variations caused by changes in the exchange rate will not be factored into this criteria.

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(2) The COTR will prepare constructive feedback, as appropriate, to evaluate the contractor's progress in meeting the EOP Fee objectives. This feedback will be provided to the contractor by the Contracting Officer at approximately the following dates: January 31, 2009, and January 31, 2010. Scoring and adjectival ratings will not be provided on this periodic feedback.

(3) The fee structure includes at least 10% of the total fee in the End of Program Fee. Consistent with Clause B.3, Contractor/Subcontractor Fee Arrangement, it is specifically understood and agreed that all requirements herein will be performed on a "No-Fee" basis by the Contractor, and any reference in this contract and incorporated clauses to "Fee", "Fixed-Fee", "Profit", or "End of Program Fee", shall be considered to be applicable to the Subcontractor. Future contract changes which add or delete content to the contract shall add or delete, respectively, 10% of the total available fee for the individual changes to the End of Program Fee pool in calendar year 2010. Contract changes related to ISS work, and task orders will not affect the pool.

Table A – End of Program Fee Scoring System

ADJECTIVE RATING	RANGE OF POINTS	DESCRIPTION
Excellent	100 - 91	Of exceptional merit; exemplary performance in a timely, efficient manner; performance meets or exceeds contract requirements (e.g., contract standards); very minor (if any) deficiencies with no adverse effect on overall performance
Very Good	90 - 81	Effective performance; requirements accomplished in a timely, efficient manner for the most part; substantially exceeds minimum contract requirements (e.g., Maximum Error Rates) with only minor deficiencies.
Good	80 - 71	Effective performance; exceeds minimum contract requirements (e.g., Maximum Error Rates); reportable deficiencies, but with little identifiable effect on overall performance.
Satisfactory	70 - 61	Performance which meets minimum contract requirements (e.g., Maximum Error Rates); reportable deficiencies with identifiable, but not substantial, effects on overall performance.
Poor/ Unsatisfactory	60 - 0	Overall performance does not meet minimum contract requirements (e.g., Maximum Error Rates); remedial action required in one or more areas; numerous deficiencies which adversely affect performance.

(End of Attachment)

Attachment J-2
Canadian Commercial Corporation (CCC) Fixed Rates
11 August 2009

1. Labor - at the following interim hourly rates inclusive of overhead and G&A, exclusive of profit:

Categories	Negotiated Rates for Calendar Year:				
	2008	2009	2010	2011	2012
J1 Senior Engineer					
J2 Intermediate Engineer					
J3 Engineer					
J4 Students					
J5 Computer System Development					
F1 Senior Manufacturing Engineer					
F2 Intermediate Manufacturing Engineer					
F3 Manufacturing Non-Engineer					
G1 Senior Product Assurance Engineer					
G2 Product Assurance Engineer					
G3 Product Assurance Non-Engineer					
M1 - Out of Plant					
M2 - Out of Plant					
M3 - Out of Plant					
M4 - Out of Plant					
DFL 1					
DFL 2					
DFL 3					
DFL 4					
DFL 5					
2. Material Handling: Materials and supplies at laid down cost in Canadian Funds plus a material handling rate of:					
All Subcontracts (Take-out):					
3. General and Administrative Overhead:					
a) Applied on Travel & Living Direct Dollars					
b) Applied on all Non-Labor Costs at Overhead					

(End of Attachment)

Attachment J-3**Data Requirements List (DRL)****(a) Introduction.**

(1) Scope. Subject to the Rights in Data clause, this Data Procurement Document (DPD) sets forth the data requirements in each Data Requirements Description (DRD) and shall govern that data required by the DPD for the contract. The contractor shall furnish data defined by the DRDs listed on the Data Requirements List (DRL) by category of data. Such data shall be prepared, maintained, and delivered to NASA in accordance with the requirements set forth within this DPD. In cases where data requirements are covered by a Federal Acquisition Regulation (FAR) or NASA FAR Supplement (NFS) regulation or clause, the regulation will take precedence over the DPD, per FAR 52.215-8. NASA-Owned/Contractor-Held records shall be managed by the Contractor in accordance with Title 36 of the code of Federal Regulations, Chapter XII B, Records Management, and NPD 1440.6, NASA Records Management. The records shall be organized in accordance with the instructions in NPR 1441.1, NASA Records Retention Schedules, as applicable. The contractor shall disposition records and non-records in accordance with NPR 1441.1, NASA Records Retention Schedules, which has been approved by NASA and the National Archives and Records Administration (NARA). All questions on records management issues shall be directed through the Contracting Officer to the JSC Records Management Officer.

(2) DPD Description. This DPD consists of a Table of Contents, an Introduction, a Statement of General Requirements, DPD maintenance procedures, and the DRDs.

(3) General Requirements. The general requirements specified in paragraph (b) of this DPD prescribe those requirements applicable to the preparation, maintenance, and delivery of data that are better defined in aggregate than in the individual DRDs.

(4) Data Requirements List (DRL). Applicable throughout the performance of the contract, the DRL provides a listing by data category of the data requirements of the DPD.

(5) Data Requirements Descriptions (DRDs). Each data requirement listed on the DRL is given complete definition by a DRD. The DRD prescribes content, format, maintenance instructions, and submittal requirements.

(6) Data Types for Contractual Efforts. The types of data and their contractually applicable requirements for approval and delivery are as follows:

Type Description

- | | |
|---|---|
| 1 | All issues and interim changes to those issues require written approval from the requiring organization before formal release for use or implementation. |
| 2 | NASA reserves a time-limited right to disapprove in writing any issues and interim changes to those issues. Data shall be submitted to the procuring activity for review not less than 45 calendar days or as otherwise agreed to between the contractor and the NASA user organization prior to its release for use or implementation. The contractor shall clearly identify the release target date in the "submitted for review" transmittal. If the contractor has not been notified of |

- any disapproval prior to the release target date, the data shall be considered approved. To be an acceptable delivery, disapproved data shall be revised to remove causes for the disapproval before its release.
- 3 These data shall be delivered by the contractor as required by the contract and do not require NASA approval. However, to be a satisfactory delivery, the data must satisfy all applicable contractual requirements.
 - 4 These data are produced or used during performance of the contract and are retained by the contractor. They shall be delivered when NASA requests it according to instructions in the request. The contractor shall maintain a list of these data and shall furnish copies of the list to NASA when requested to do so.
 - 5 These data are incidental to contract performance and are retained by the contractor in those cases where contracting parties have agreed that delivery is not required. However, the Contracting Officer or the Contracting Officer's Representative shall have access to and can inspect this data at its location in the contractor's or subcontractor's facilities.

(b) Statement of General Requirements.

(1) Applicable Documents. Documents included as applicable documents in this DPD are the issue specified in the Statement of Work, and form a part of the DPD to the extent specified herein. References to documents other than applicable documents in the data requirements of this DPD may sometimes be utilized. These do not constitute a contractual obligation on the contractor. They are to be used only as a possible example or to provide related information to assist the contractor in developing a response to that particular data requirement.

(2) Subcontractor Data Requirements. The contractor shall specify to subcontractors and vendors, if any, the availability source of all data required for the satisfactory accomplishment of their contracts. The contractor shall validate these requirements for documents when appropriate. The contractor is encouraged to refer subcontractors to the JSC Scientific and Technical Information Center for their document requirements.

(3) Reference to subcontractor data in the contractor's responses is permissible, providing the references are adequate and include such identification elements as title, number, revision, etc., and a copy of the referenced data is supplied with the response document at time of delivery to NASA.

(4) Printing. All reproduction and binding of documentation shall be in accordance with NPD 1490.1F, NASA Printing, Duplicating, Copying, Forms, and Mail Management, and NFS clause 1852.208-81, and as otherwise approved in writing in advance by the Contracting Officer.

(5) Microfilm. When microfilm of drawings, specifications, and associated lists are required, it shall be 35 mm silver halide negative, first generation (Type 1, Class 1) in accordance with 36 CFR Part 1230, Micrographic Records Management, and mutual written agreement between the Contractor and the Contracting Officer. Input Form DD Form 1562, Dual Purpose Engineering Document Card, shall be used for microfilm purposes. The microfilm shall be submitted in the form of roll microfilm or

master microfilm aperture cards. If microfilm rolls are used, they shall not exceed 100 feet in length.

(6) Distribution/Delivery. Distribution requirements of required documentation shall be in quantities determined by and to the addresses noted on a separate distribution list to be furnished by the Contracting Officer.

(7) When A Reproducible Is Required. Microfilm or an unbound copy shall be provided. The microfilm shall conform to paragraph 2.4. The unbound copy shall be of good black and white quality suitable for reproduction by microfilm or photocopy (or equivalent process).

(8) Data Format Using Automated Data Processes. The contractor is encouraged to use automated data formats unless specified otherwise in this contract. Choice of automated versus manual formats for specific documentation submittals, as required by this DPD, shall be made giving full consideration to cost of preparation of the item, criticality of schedule performance, and usability of the documentation involved. Regardless of which method (automated or manual) is selected, the data submittal shall conform to the content requirements specified in the applicable data requirements description. In instances where minor changes to these content requirements will result in significant cost reductions without affecting the usability of the documentation involved, the Contracting Officer shall be so advised with appropriate recommendation as to changes.

(9) When Electronic Data Submission is Required.

(i) DRDs will specify if part or all of the data is to be provided in an electronic format.

(ii) The contractor shall obtain approval of the Contracting Officer for deviation from the above standards, or for approval of other file formats not specifically listed.

(iii) Data transfer (delivery) mechanisms. The contractor shall utilize one or more of the following electronic transfer mechanisms to deliver data to the Government over the network:

(A) Transmission of data requirements by profiling and storing in the program data and configuration management system (Jeeves), unless otherwise noted in the DRL. Distribution is accomplished by system electronic mail notification of availability for review and approval, as required, by NASA unless otherwise noted in the DRL.

(B) Transmission of data to a Contracting Officer designee via electronic mail, with the inclusion of file attachments as necessary.

(10) Delivery Protocol. The contractor shall transmit an electronic mail message to the Contracting Officer designee clearly identifying any deliverables transferred to the Government and the network location of the data transferred, if delivery methods 2.5.4.3 a-c are used. All files transferred shall be clearly identified as to the deliverable data item and sub-part thereof that they represent. For deliverables consisting of multiple data files, the order in which files are to be perused/printed shall be clearly identified.

(11) Contractor's Internal Documents. The contractor's internal documents shall be used to meet the data requirements of this DPD unless a specific format is required by the applicable DRD.

(12) Reference to Other Documents in Data Submittals. All referenced documents shall be made readily available to the cognizant NASA organization upon request. The contractor should make sure that the references are available to NASA in a manner which does not incur delays in the use of the response document.

(15) Maintenance of Type 1 Document Submittals.

(i) Revisions of Type 1 documentation may be accomplished by individual page revision or by a complete reissue of the document in accordance with the required Document Development Plan with the exception of drawings (which shall be revised in accordance with contract configuration management requirements).

(ii) Individual page revisions shall be made as deemed necessary by the contractor or as directed by the Contracting Officer.

(iii) A Type 1 document shall be completely reissued when, in the opinion of the contractor and/or NASA, the document has been revised to the extent that it is unusable in its present state, or when directed by the Contracting Officer. When complete reissues are made, the entire contents of the document shall be brought up to date and shall incorporate revised pages. All revisions shall be recorded. A revision log shall identify complete reissues except for periodic reports and documents which are complete within themselves as final.

(iv) Changes of a minor nature to correct obvious typing errors, misspelled words, etc., shall only be made when a technical change is made, unless the accuracy of the document is affected.

(v) All revised pages shall be handled in accordance with procedures defined in the Document Development Plan. Document change histories shall be recorded on JSC form 28 and included in all document deliverables.

(vi) Contractor Type 1 documents shall not be submitted containing pen and ink markups which correct, add to, or change the text, unless schedule problems exist and approval is obtained in writing from the Contracting Officer. Such markups, however, shall not exceed 20 percent of the page content and shall be acceptable provided that the reproduced copies are legible. In addition, hand-drawn schematics, block diagrams, data curves, and similar charts may be used in original reports in lieu of formally prepared art work, as long as legibility of copies is not impaired. Acceptability will be determined by the Contracting Officer.

(16) "As Required" Annotations. Various DRDs include the annotation "as required" in items 9, Initial Submission, 10, Submission Frequency; or 13.5, Maintenance. Unless specified otherwise, "as required" means as deemed necessary by the contractor, the Government, or applicable documentation.

(c) DPD Maintenance Procedures.

(1) NASA-Initiated Change. New and/or revised data requirements will be incorporated by contract modification to which the new or revised portion of the DPD will be appended. The contractor shall notify the Contracting Officer in the event a deliverable data requirement is imposed and is not covered by a DRD, or when a DRD is

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changed by a contract modification and for which no revision to DPD is appended. In such cases, the contractor shall submit the requested changes to NASA for approval. See paragraph 3.3.1 for change procedures.

(2) Contractor-Initiated Change. Contractor-proposed data requirements, or proposed changes to existing requirements shall be submitted to NASA for approval.

(3) DPD Change Procedures. Changes to a contractual issue of this DPD will be identified in the DRL when incorporated by Supplemental Agreement.

(4) DPD Reissues.

(i) When conditions warrant, the DPD will be reissued by NASA and will supersede the existing DPD in its entirety. Reissues will be implemented by contractual direction.

(ii) All revision symbols (vertical lines and contractual direction control numbers) and revision dates will be removed from all pages. The issue symbol, which will commence with "A" and progress through "Z," will be entered in the DRD identification block of each DRD page of the DPD. The date of the contractual direction will be entered on the cover page of the DPD. This issue symbol will also be entered under the "Status" column on the Page Revision Log adjacent to each page and DRD entry. Document Change Logs will otherwise be changed in the same manner as for DPD revisions.

Data Requirements List (DRL)

DRD	Data Type	DRD Title	Revised By
1	3	Program Review Documentation	
2	3	Weekly Status Report	
3	3	Program Plan	
4	4	Change Request (CR) Schedules	
5	4	Work Breakdown Structure (WBS)	
6	1, 3	Contractor Financial Management Report (NASA Form 533M)	Mod 5
7	2	Management Plan	
8	2	Data Management Plan	
9	2	Quality Manual (QM)	
10	2	Safety and Health Plan	
11	2	NASA and Gidep Alert Plan	
12	1	Change Requests (CR)	
13	3	Design Review Documentation	
14	1	Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)	
15	2	System Safety Plan	
16	1	Shuttle Safety Analysis Report (SAR) and Hazard Report (HR) and Station Hazard Reports (SHR)	
17	2	Test Procedures	
18	2	Acceptance Data	
19	3	Limited Life Item List	

DRD	Data Type	DRD Title	Revised By
20	1	End Item Shipping Documentation Package	
21	3	Commercial Off-the-Shelf Manuals & Documentation (COTS)	
22	1	Problem Reporting and Corrective Action (PRACA) for Johnson Space Center (JSC) Government Furnished Equipment (GFE)	
23	2	Engineering Change Notice (ECN)	
24	2	Materials and Processes (M&P) Summary Report and Material Usage Agreement (MUA)	
25	2	Non-Standard EEE Parts Usage Approval Requests (NSPARs)	
26	1	Waiver/Deviation Approval Requests	
27	1	SRMS Board Certification Approval Request (SRMSCAR) and Government Certification Approval Request (GCAR)	
28	2	Product Assurance Plan	
29	2	Software Deliverables	
30	2	Software Safety Analysis Report (SSAR)	
31	2	Reliability & Maintainability (R&M) Plan	
32	2	Contract End Item (CEI) Specification and Verification Plan	
33	2	Certification Data Package (CDP)	
34	1	Electrical, Electronic, and Electromechanical (EEE) Parts Control	
35	1	Non-Conformance (NC) Record	
36	2	Property Management Plan	
37	4	Task Orders Authorized	
38	4	Headcount Report	
39	1	End of Program Plan	
40	4	Financial Reporting Contractor-Held Property	
41	2	IT Security Plan For SRMS Servers	

(End of Attachment)

Attachment J-4
Data Requirements Description (DRD)

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1. **ISSUE:** BASIC
2. **DRD NO.:** 1
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Program Review Documentation
7. **DESCRIPTION/USE:** Prepare and provide the documentation necessary to support management and technical reviews.
8. **DISTRIBUTION:**
MV/Contracting Officer's Technical Representative (COTR)
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** Quarterly
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:**
SOW Sections C.1, C.1.1.3.1.1, C.1.3.3.2, and C.1.3.3.5.4; MDA MR-PR.007; and DRDs 2-6
13. **DATA PREPARATION INFORMATION:** None.
 - 13.1 **SCOPE:** Management and technical reviews.
 - 13.2 **APPLICABLE DOCUMENTS:** None.
 - 13.3 **CONTENTS:** The prepared data shall cover the following areas and contents:
 - (a) Agenda and Schedule - Suggested top level schedule may be provided by the NASA COTR prior to the meeting. Scheduling of individual presentations over the course of the review is at the discretion of the Contractor. Contractor detailed agenda should be prepared by the first day of the review.
 - (b) Presentations - This information shall consist of visual media that covers the status, schedules, issues, and problems and proposed resolutions/workarounds for each contracted activity.
 - (c) Handouts - Handouts consist of hard-copy reproductions and electronic files of visual data presented at the review, background information, and any written material handed out during the review.
 - (d) Performance Reviews (IPR) - The management reviews for the program consist of status reviews on all contracted activities and any special topics related to problem resolutions, budget planning, and future program activities. These meetings are held on a quarterly basis at the Contractor's facility.
 - (e) Technical Reviews - Technical reviews for the program are detailed reviews held at either the Contractor or Subcontractor facility. Duration of these reviews is usually 2-3 days and consists of presentations by the individuals involved in the work and discussions on the details of the implementation of requirements, problems, or design issues related to that project and proposed resolutions/workarounds.
 - 13.4 **FORMAT:** Electronic, in the contractor's format.
 - 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 2
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Weekly Status Report
7. **DESCRIPTION/USE:** To provide insight into status of all activities under contract with special emphasis on significant issues and items on the critical path for manifest support.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** Weekly.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs: 01, 03, 04, 05, 07
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** Progress of activities against the schedules.
- 13.2 **APPLICABLE DOCUMENTS:** C.1, C.1.1.3.1.1, C.1.3.3.2, C.1.3.3.5.4
- 13.3 **CONTENTS:**
 - (a) The Contractor's weekly status reports shall be in a brief, informal, narrative format which describes the progress of activities against the schedules with reasons for differences. Report items are to be categorized as Priority A or B. Priority A items will report technical work and schedule status. Priority B items will be presented for information only.
 - (b) The Contractor shall ensure that responsible personnel are in attendance to present their work status, respond to questions, and provide additional detail if requested.
 - (c) The Weekly Status Report will be presented via teleconference.
- 13.4 **FORMAT:** Electronic, in the contractor's format, and by teleconference.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 3
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Program Plan
7. **DESCRIPTION/USE:** To provide the means to analyze contracted work cost performance against contract value, and allow for the cost planning of future work. The data in the Program Plan is to be reconcilable to the NF533 reports.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** Monthly
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs: 05, 06, 12
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** Progress of activities against the schedules.
- 13.2 **APPLICABLE DOCUMENTS:** C.1, C.1.1.3.1.1, C.1.1.3.1.2, MDA MR-PR.007
- 13.3 **CONTENTS:** Program Plan shall be able to:
 - (a) Summarize data by program.
 - (b) Summarize data by agreed to summary levels.
 - (c) Provide contract value data.
 - (d) Provide actual cost data (accrued costs for FFP work).
 - (e) Provide estimate to complete data (updated every 1 months as a minimum).
 - (f) Provide variances.
 - (g) Summarized by NASA fiscal year.
 - (h) Provide data in both Canadian and US dollars.
- 13.4 **FORMAT:** Electronic, in the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 4
3. **DATA TYPE:** 4
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Change Request (CR) Schedules
7. **DESCRIPTION/USE:** To provide the means to analyze contracted work schedule performance against the contracted baseline.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** Schedules shall be prepared and submitted for each discrete Change Request. The schedule shall be statused on a weekly basis, and be available through the Jeeves system.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs: 01, 02, 03, 04, 05, 12
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** Change requests.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.1.2, PM-PR.003
- 13.3 **CONTENTS:** Schedules shall contain, as a minimum, the following time-phase tasks and events:
(1) Major Reviews: including design; test readiness; and acceptance.
(2) Hardware activities: including, procurement/fabrication/assembly; configuration inspection/checkout/authority to proceed; and acceptance/delivery.
- 13.4 **FORMAT:** Electronic, and presented in either a graphic format (Gantt chart), or network diagram. The Gantt chart shall be capable of displaying both the current status and the contracted baseline.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 5
3. **DATA TYPE:** 4
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Work Breakdown Structure
7. **DESCRIPTION/USE:** The WBS provides the framework for program reporting.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** As requested.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs: 01, 02, 03, 04, 06, 07, 12
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** WBS
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.1.2
- 13.3 **CONTENTS:**
 - (a) The WBS will be used as a framework by which to define requirements, plan effort, assign responsibilities, allocate and control costs and resources, and report progress, expenditures, technical and schedule performance.
 - (b) The WBS shall consist of indented list of element titles, scope/summary of each element, and a diagram to clearly indicate element relationships. The following represents the basic structure.
 - LEVEL I Summary
 - LEVEL II Program Level
- 13.4 **FORMAT:** Electronic, in the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 2. **ISSUE:** BASIC
3. **DATA TYPE:** Initial 533 Baseline Reports: 1
NASA Forms 533M
2. **DRD NO.:** 6
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Financial Management Report (NASA Form 533M)
7. **DESCRIPTION/USE:** To provide financial management reports for planning, monitoring, and controlling project resources; accounting for the contract's accumulated expenditures and other liabilities; accruing cost in NASA's accounting system; evaluating contractor cost performance; and projecting/forecasting cost and work force resource requirements which realistically support the schedule requirements.
8. **DISTRIBUTION:** BV/Contracting Officer; LF/Cost Accounting; LM/Resource Management; and MV/COTR
9. **INITIAL SUBMISSION:** The initial NF533 report is required in the NF533Q format to be used as a baseline for the life of the contract. The initial (baseline) NF533Q report shall be submitted by the contractor within 30 days after authorization to proceed has been granted. The initial report shall reflect the original contract value detailed by negotiated reporting categories and shall be the original contract baseline plan.
10. **SUBMISSION FREQUENCY:**
 - (a) Initial baseline 533 reports - at time of initial submission, and when the Contracting Officer requires additional detail as necessary such as when options are exercised.
 - (b) 533M - Due not later than 12 working days following the close of the contractor's monthly accounting period.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** SOW C.1.1.3.1.2; DRDs 01, 03, 04 and 05; All data shall be reconcilable with data from all of the reports required by this DRD, the reports required by DRD 01, and the Performance Measurement System (DRD 03, 04 and 05).
13. **DATA PREPARATION INFORMATION:**
 - 13.1 **SCOPE:** The Report provides data on accumulated costs and funding projections for management of the contract and shall serve as the basis for contractor communication with NASA concerning financial planning and control.
 - 13.2 **APPLICABLE DOCUMENTS:** NFS 1852.242-73, NASA Contractor Financial Management Reporting; NPD 9501.1G, NASA Contractor Financial Management Reporting System; and NPR 9501.2D, NASA Contractor Financial Management Reporting
 - 13.3 **CONTENTS:** NASA is required by law to maintain accrual accounting, which requires cost to be reported in the period in which benefits are received, without regard to time of payment. Examples of accrual accounting for common cost elements reported on the NF533 follow:
 - (a) Cost Element
 - (1) Labor: Reported to NASA as hours are incurred.

DRD CONTINUATION SHEET

Section J.4

TITLE: Financial Management Report (NASA Form 533M)
DATA TYPE: 1, 3

DRD NO.: 6
PAGE: 2/2

(2) **Materials:** Generally reported to NASA when received and accepted by the contractor. Defined as any equipment that is produced to specific requirements that make it useless to anyone else without rework. Cost should be reported to NASA as the equipment is being manufactured. The straight-line method for estimating accrued costs or the use of supplemental information obtained from the vendor are acceptable methods used to calculate the cost accrual amount.

(3) **Travel:** Reported to NASA as costs are incurred.

(4) **Subcontracts:** Actual and estimated costs reported by prime contractors shall include subcontractors' incurred costs for the same accounting period. Where subcontract costs are material, they should be separately identified on NF533 reports. The prime contractor shall include in the total cost of each subdivision of work the accrued cost (including fee, if any) of related subcontractor effort. Subcontractors should, therefore, be required to report cost to the prime contractor, using the accrual method of accounting. If the G&A and fee reported by a subcontractor are at the total subcontractor level, these costs must be allocated to specific sub-divisions of work.

(5) **Fee:** Should be accrued as earned using a consistent and auditable method to determine the amount. For example: an acceptable method would be to use historical data to determine the amount to accrue each month. Fee should be reported on the NF533 following the "Total Cost" line. Award fee must be reported by the following categories: Base Fee, Fee Earned, Interim Fee, Provisional Fee, Potential Additional Fee, and Total Fee. If any of the above fee categories do not pertain, they should not be included in the NF533.

(b) The NF533 reports are the official cost documents used at NASA for cost type, price redetermination, and fixed price incentive contracts. The data contained in the reports must be auditable using Generally Accepted Accounting Principles. Supplemental cost reports submitted in addition to the NF533 must be reconcilable to the NF533.

(c) Two sets of 533s shall be provided, one set in Canadian Dollars and one set in U.S. Dollars (WBS Levels I and II only).

(d) Uncompensated overtime hours worked should be reported on NF533 reports as a separate line item or in the footnotes.

(e) For contracts which have multiple schedules, a summary NF533 is required to provide a cumulative from inception cost for the contract, regardless of schedule.

(f) Column 7b (planned cost incurred/hours worked for the month) and 7d (cumulative planned cost incurred/hours worked) of the NF533M represent the negotiated baseline plan for the contract. There may not be a relationship between the estimates provided in columns 8 of the NF533M to columns 7b and 7d. Columns 7b and 7d represent the legally binding contract negotiated baseline plan plus all authorized changes.

(g) Short and long-term cost estimates, which include all data entered in columns 8 and 9a on the NF533M report, shall be based on the most current and reliable information available.

(h) Prior period cost adjustments should be reported in column 7a and 7c of NF533M with a footnote discussing the reasons for and amounts of the adjustments.

(i) Monthly NF533 reporting is no longer required once the contract is physically complete, provided the final cost report includes actual cost only (no estimates or forecasts). The contractor must continue to submit monthly NF533 reports as long as estimates for the following period are included. If the final cost of a contract changes after the submission of the "final" contractor cost report, the contractor must submit a revised NF533 report in the month the cost change is recognized.

(j) Column 7e (Government Fiscal Year to Date) of the NF533 represents all cost incurred to date for the current Government Fiscal Year.

13.4 **FORMAT:** These reports shall be prepared in accordance with NPR 9501.2D and NFS 1852.242-73, and be provided in electronic form.

13.5 **MAINTENANCE:** Changes shall be incorporated as required by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 7
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Management Plan
7. **DESCRIPTION/USE:** This document shall be the master plan which describes the overall Contractor system for the conduct and implementation of the contract statement of work.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** WBS
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.1.1
- 13.3 **CONTENTS:**
 - (a) The plan contents should be summary in nature but should provide sufficient information to define the concepts and techniques to be employed in the Contractor's approach to program management of this program.
 - (b) The plan shall consist of an index of the Contractor's internal operation plans, directives, and procedures for each of the following areas with a brief discussion as to how they will be utilized in managing the program and fulfilling the requirements: Program Management; Performance Management; Configuration Management; Information and Data Management; Quality Assurance, Reliability, and Safety Management; Engineering Management; and Logistics Management. The Contractor may add subjects as deemed appropriate and necessary in order to convey the total program plan.
 - (c) The plan shall include a current organization chart for the organization responsible for conducting the program. The chart shall show lines of authority and how the program fits within the corporate organization structure. Supporting documentation shall be furnished to document the roles and responsibilities, task assignments, products, amount of effort, and management relationships for each organizational unit responsible for the program. The Contractor shall identify by name the key management personnel in all functional areas. The Contractor shall provide anticipated/projected hiring dates for vacant positions. The plan shall provide notification of any significant changes to the Contractor's organization, method of operation, or to the project management network.
 - (d) The plan shall identify key subcontractors and describe the Contractor's system for control over all subcontractors and vendors. Subcontractors shall provide notification of any significant changes to their organization (e.g., personnel changes, accounting system) or method of operation.
 - (e) Upon NASA approval, the plan shall form the basis for the Contractor's overall program management system and shall be updated and submitted to NASA for approval as revisions are required. In case of conflict the Statement of Work will take precedence.

DRD CONTINUATION SHEET

NNJ08GA03C

Section J.4

TITLE: Management Plan

DATA TYPE: 2

DRD NO.: 7

PAGE: 2/2

13.4 **FORMAT:** In the Contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 8
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Data Management Plan
7. **DESCRIPTION/USE:** To provide a plan for the acquisition, preparation, release, change, revision, and control of all data and documentation prepared in support of the Program.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.1.3, DM-PR.020
- 13.3 **CONTENTS:**
 - (a) The plan shall contain details of methods and procedures to be used to acquire, maintain, and control all data and documentation prepared in support of the program.
 - (b) When describing methods and procedures, the plan is to address how the contractor ensures that data is accessible and describes the process of protecting the data through security measures and backups.
 - (c) Data under this DRD includes, but is not limited to all design and test documentation, developed software, "Off The Shelf" software, as-designed and as-built configurations, documentation of any non-standard component or materials usage, and such information from the Acceptance Data Package/EIDP that is deemed necessary to support operations, maintenance, and new production of LRUs and/or subsystems.
- 13.4 **FORMAT:** In the Contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 9
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Quality Manual
7. **DESCRIPTION/USE:** The Quality Manual (QM) or Business Process System Manual (BPSM) is used to document the details of the Contractor's Quality Management System (QMS) including management commitment to quality, system elements, policy, and practice.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 07, 24, 26, 34
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, C.1.3.3.5.1, NSTS 5300.4 (1D-2), SAE AS9100, MR-MAN.001, MR-PR.001
- 13.3 **CONTENTS:**
 - (a) Contents: The Quality Manual shall identify each element of the contractually imposed QMS requirements, including supplements to SAE AS9100. Elements shall be addressed sequentially in narrative form, and in sufficient detail to describe the philosophy and approach for implementation. Existing policies and procedures may be utilized where contractual requirements can be met. The manual shall include traceability from the quality elements of SAE AS9100 to the specific Contractor Procedures which support those elements.
 - (b) Maintenance: All updates shall consist of notes or changes to the Business Process System Manual, clearly identified as to where applicable (i.e., system element, page/paragraph number, etc).
 - (c) All documents and changes to those documents detailing intended implementation of the requirements of SAE AS9100 applicable to activities under this contract are to be submitted for review by NASA. NASA reserves the right to accept or reject Contractor proposed implementations based on NASA Requirements.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 10
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Safety and Health Plan
7. **DESCRIPTION/USE:** Implements the standards, plans, and reporting procedures contemplated by clause NFS 1852.223-70 entitled "Safety and Health."
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 07 and 15, NFS Clause 1852.223-70
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, C.1.3.3.5.5, JPR 1700.1, MDA Safety and Health Plan [(MDA-STD-M.7915 (s.6.0)), NPR 8621.1, and NPR 8715.3.
- 13.3 **CONTENTS:**
 - (a) Safety and Health Plan: The safety portion of the plan will identify the safety engineering and other safety services the Contractor will provide to perform safely the work under this contract. Safety items to be covered in the plan shall include, as a minimum, those outlined below.

(1) Policy	(7) Hazardous Operations Permit
(2) Safety and Health Program Management Structure	(8) Fire Prevention
(3) Safety and Health Program Management	(9) Certifications and Training of Personnel
(4) Procurement and Contract Safety	(10) Protective Equipment
(5) Hazardous Materials Handling	(11) Self-Evaluation and Reporting
(6) Hazardous Operations	(12) Mishap reporting and Investigation
 - The Safety Plan will be approved by the Contracting Officer and/or his designated representative.
 - (b) Mishap and Corrective Action Reporting: The Contractor shall report immediately (8 hours) by telephone and NASA Form 1627, NASA Mishap Report, to the JSC Safety and Test Operations Division via JSC-Safety-Report-Submittals@mail.nasa.gov, or by fax to minimum required information for Type A and B mishaps, damage to equipment, mission failure, or any mishap with the potential to result in same as defined in NPR 8621.1, "NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping". Other reportable events are incidents requiring first aid to personnel or minor property damage, and close calls which had the potential to result in serious injury or damage. Contractor mishaps at KSC will be reported to the KSC Institutional Safety Branch, SA-E2, with an information copy to the JSC Safety and Test Operations Division as outlined above. Within 10 days of the mishap, the Contractor should complete investigation of the mishap, develop a corrective action plan, and complete NASA Form 1627 for submission to NASA as described above.
 - (1) Safety Assessment Report: An annual written self-evaluation and assessment report shall be submitted to NASA during the first quarter of the new year.
 - (2) Health and Medical: Work exposures related to potentially toxic or health hazardous chemical or physical agents will be Evaluated by JSC Environmental Health Services upon notification and must be

DRD CONTINUATION SHEET

TITLE: Safety and Health Plan

DATA TYPE: 2

DRD NO.: 10

PAGE: 2/2

properly controlled by the Contractor as advised. The JSC Occupational Health Officer shall be notified prior to initiation of any new or modified operation potentially hazardous to health. When safety and health and medical issues arise at the NASA Centers during the course of contract performance, the Requirements of that Center take precedence. At the Contractor's facility in Canada, the Contractor shall comply with its own company policies and Canadian regulations.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 11
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Government-Industry Data Exchange Program (GIDEP) and NASA Advisory Problem Data Sharing and Utilization Program Documentation and Reporting
7. **DESCRIPTION/USE:** This DRD provides the minimum information to be incorporated into the contractor's and sub tier implementation procedure and contractual data reporting requirements to comply with the program's requirement to participate in GIDEP and NASA Advisory Problem Data Sharing and Utilization Program. This includes:
 - Contractor's and Sub Tier Implementation Procedures
 - Preparation and submittal of GIDEP Documents
 - Preparation and submittal of NASA Advisories
 - Task Management, Control and Tracking Status
 - Milestone/Mission Support—Assessment/Impact Status Reports
 - Cost Data on Special Problems (involving criminal investigations)
8. **DISTRIBUTION:** As required in NPR 8735.1. Must include MV/COTR, and JSC GIDEP/NASA Advisory Coordinator
9. **INITIAL SUBMISSION:**
 - (a) Contractor's and Sub Tier Implementation Procedures: 60 days after contract award
 - (b) Release of GIDEP Documents: In compliance with GIDEP Operation Manual and Policy
 - (c) Release of NASA Advisories: In accordance with NASA Policy
 - (d) Problem Data Assessments: 30 days after receipt of the Problem Data
 - (e) Milestone/Mission Support: As required to support the milestone or mission event
 - (f) Cost Data: As required for special problems involving criminal investigations
10. **SUBMISSION FREQUENCY:** As required in NPR 8735.1
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 19, 22, 34
13. **DATA PREPARATION INFORMATION:** None.
 - 13.1 **SCOPE:** Generic problems reported by the GIDEP or NASA Advisory Distribution networks shall be assessed to determine if there is an impact or potential impact to the program or program assets. Generic problems experienced by the program or by program assets shall be reported in the GIDEP or NASA Advisory network, as appropriate. Management documentation shall be adequate to assure that the subject problem data are received, properly distributed, thoroughly assessed for potential impact; identified impact issues are resolved or corrected with NASA program management concurrence; cost data for special problem issue is to be accumulated and reported; and all of this information is to be captured and retained in a database.
 - 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, NPG 8735.1, PE-PR.020, PE-WI.096, (SO300-BT-PRO-010 GIDEP Operations Manual, SO300-BU-GYD-010 GIDEP Requirements Guide)

DRD CONTINUATION SHEET

TITLE: Government-Industry Data Exchange Program (GIDEP) and NASA Advisory Problem Data Sharing and Utilization Program Documentation and Reporting

DRD NO.: 11

DATA TYPE: 2

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13.3 CONTENTS:

- (a) The contractor's and sub tier Implementation Procedures shall provide the details that will assure that the contractor understands and will implement these procedures that cover the scope, importance of task, management's responsibilities, technical expertise to identify and resolve any impacts, "special problem" information sensitivity, and documentation necessary to comply with GIDEP and NASA policies.
- (b) GIDEP documents are to comply with the operations manual requirement for the appropriate document being prepared and released.
- (c) NASA Advisories are to comply with contents as required to complete the JSC Form (JF) 1159 and to accurately report the problem and conditions.
- (d) Implementation documentation shall include an index of problem reports received and assessed for impact, hardware/systems/subcontractors subjected to the assessments, status of the impact assessments by problem report by hardware/ system/subcontractor, corrective actions for problems with identified impacts including NASA program management's involvement and concurrence, and the required supporting documentation for all problems experienced on the program/project that meet the criteria for the release of a GIDEP Report or NASA Advisory and the released GIDEP Reports and NASA Advisories. This includes any other data required to comply with the applicable GIDEP and NASA documents.
- (e) Details of the required Milestone/Mission support efforts and reports with the associated roles and responsibilities.
- (f) Financial data to justify and substantiate any reported "Cost Impacts."
- (g) Special controls shall be implemented to comply with the confidentiality of the problem reports involving criminal investigations. The implementation procedures must address this special need for the control of information with the restricted distribution as well as the need to track and report the cost of the problem investigation and resolution.

13.4 FORMAT: Electronic submittal is the preferred media for providing access to or submittal of information and data under this DRD. Format guidelines are as follows:

- (a) The contractor's format is acceptable for their Internal Implementation Procedures.
- (b) GIDEP documents are to be prepared on appropriate GIDEP form found in the GIDEP Operations Manual.
- (c) NASA Advisories are to be prepared on the JSC Advisory Form, JF1159.
- (d) The contractor's format is acceptable for providing the Task Management, Control, and Tracking Status as long as it includes all of the necessary information. An electronic database with access permission to appropriate NASA personnel is preferred. Formats for these reports are to comply with the applicable Milestone/Mission event
- (e) Cost data is to be provided as required by financial management reporting system and to the details required to support the criminal investigations.

13.5 MAINTENANCE: Data shall be maintained as required to document the current implementation procedures and GIDEP and NASA Advisory policies; make sure that the released information is complete, factual, accurate and up-to-date and stay current and accurate, or as requested.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 12
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Change Requests (CR)
7. **DESCRIPTION/USE:** To respond to requests for proposals from the procuring authority for activities including maintenance, upgrades, development, and production programs related to the program and its continuing Shuttle support.
8. **DISTRIBUTION:** MV/COTR and BV/Contracting Officer
9. **INITIAL SUBMISSION:** As required.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 04 and 05
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1, C.1.1.3.1.1, C.1.3.3.2
- 13.3 **CONTENTS:** CRs shall contain, as a minimum, the following information:
 - (a) Technical:
 - (1) Description of the work including references to existing applicable contractor level specifications and SOWs, and copies of specifications and SOWs written to support the proposed activity.
 - (2) Part and serial numbers of existing or proposed hardware/software.
 - (3) Effects on existing specifications, assembly drawings, ICDs, etc.
 - (4) Impacts on other system components or subassemblies.
 - (5) Impacts on other projects or spares inventories.
 - (6) Impacts on safety, reliability, quality, and maintainability.
 - (b) Programmatic:
 - (1) Schedules and associated supporting data.
 - (2) Resources and staffing information for both contractor and subcontractor indicating types of skills to be utilized, hours associated with individual scheduled tasks, and time phased listings of hours by skill type indicating time period totals and total hours proposed.
 - (c) Cost:
 - (1) Approved report format, which includes all top level project proposed hours and costs.
 - (2) Cost/price details and backup including:
 - (i) Breakdown of hours by type and hourly rate for direct and overhead labor.
 - (ii) Rates, content, and rationale for non-labor costs.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 13
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Design Review Documentation
7. **DESCRIPTION/USE:** To provide detailed design information in preparation to support design reviews and document proceedings of the reviews.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Two weeks prior to holding the Design review.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 16 and 34
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.1.1, C.1.1.3.3.2, C.1.3.3, C.1.3.3.2, PE-PR.004, PE-WI.023
- 13.3 **CONTENTS:** Design reviews for the Program are held in support of development, redesign, and new production Programs, they are normally held as a conference. Specific design review requirements and schedules shall be addressed for each project as contracted.
 - (a) Prior to Review: Documentation datapack requirements for design reviews shall include, but are not limited to:
 - (1) Agenda and schedule for the review containing information on presentations planned and providing time allocations for standard design review activities such as Review Item Disposition (RID) preparation and reviews, pre-boards, and final design review board.
 - (2) Information to be presented by the Contractor at the design review.
 - (3) Background information such as requirements documents, specifications, drawings, schematics, schedules, and manpower requirements.
 - (b) Post Review report package:
 - (1) Revised datapack (to include any additional presentations or backup material provided during the review).
 - (2) Pre-board and Board presentations.
 - (3) RID package (RIDs showing Contractor comments, dispositions, and signatures).
 - (4) Minutes of Pre-board and Board (signed by Contractor Program Manager and NASA Technical Manager).
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 14

3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)[FMEA-1]
7. **DESCRIPTION/USE:** To identify to program management the risk associated with design, use, and failure of systems. The FMEA serves as a source that documents the systematic evaluation by item failure mode analysis, the potential impact of each functional or hardware failure on mission success, personnel, and systems safety, system performance, maintenance, and maintainability requirements. Each potential failure is assessed in order that appropriate corrective action(s) may be taken to eliminate or control the high-risk items. The CIL documents the item's inability to meet program requirements.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Initial at Preliminary Design Review.
10. **SUBMISSION FREQUENCY:** Updates provided at subsequent milestone reviews and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 16, 17, 22
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, NSTS 22206, SSP 30234, PE-PR.029, SPAR-RMS-PA.1067
- 13.3 **CONTENTS:**
 - (a) Scope:
 - (1) The FMEA and CIL are applicable to all Government-furnished equipment classified as flight hardware, the FMEA (only) is also applicable to EGSE that directly interfaces with flight hardware.
 - (2) The FMEA/CIL shall be performed on program hardware to the equipment level consistent with the Process Levels identified in the SOW (Section C.1.1.3.3.1) or identified on-orbit maintenance level and ground support equipment as specified in SSP 30234.
 - (b) Format:
 - (1) Delivery through the electronic program database, Jeeves, or through data keyed directly into the NASA application. (JSC will identify the available application.) The format of the FMEA and CIL shall be in accordance with NSTS 22206 "Instructions for Preparation of Failure Modes and Effects Analysis FMEA) and Critical Items List (CIL)". The data element format shall be specified in SSP 30234.
 - (2) A suggested format is provided, and available on Jeeves.. Other formats are acceptable provided all FMEA data elements are included, NSTS 22206, table 3.0 for FMEAs and table 4.0 for CILs refers.
 - (c) Contents:
 - (1) The hardware provider shall provide FMEAs and CILs for project and program management. The FMEA/CIL contents are specified by SSP 30234.

DRD CONTINUATION SHEET

TITLE: Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)[FMEA-1]
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(2) An FMEA shall be performed on every system, subsystem, assembly, or item to identify failure modes and the effects thereof for support of additional design action, safety analysis, hardware/software interface analysis, test planning, mission planning, preparation of mandatory inspection points, fault detection and isolation, maintainability analysis and planning, maintenance planning, and logistics planning.

(3) The FMEA shall be conducted and prepared in accordance with NSTS 22206. The FMEA may be sufficed by a properly completed criticality worksheet alone if the system, subsystem, assembly, or item under analysis is non-critical.

(4) The CIL is used to identify critical items which require special risk assessments to support the activities supported by the FMEA and waivers to program requirements. The CIL shall be conducted and prepared in accordance with NSTS 22206.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 15
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/4
6. **TITLE:** System Safety Plan
7. **DESCRIPTION/USE:** Establishes system safety tasks and activities to identify, evaluate, and eliminate, or control hazards associated with flight hardware and operations.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 10, 14, 16
13. **DATA PREPARATION INFORMATION:**

The Safety Plan shall address safety policy, applicable documents, task descriptions, products, and Processes during the design, development, test, production, and operational phases of flight hardware. The Safety Plan shall set forth safety tasks, products, and processes. It serves as a planning and management tool for ensuring safety tasks are performed as an integral part of the design, development, test, production, and operational phases of the end items. Implementation of the Safety Plan shall assure hazards and their consequences are identified, evaluated, and controlled throughout all phases of the program in accordance with NHB 1700.1 (V 1-B), "NASA Safety Policy and Requirements Document," paragraphs 104, 108, and 310. Safety Plans are to be tailored for individual safety engineering projects as integral parts of a formal, disciplined system safety program implemented by NASA and the contractor Safety Plan Requirements.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, NSTS 5300.4 (1D-2), NHB 1700.1, JSC 17773, JSC 17481, NSTS 22206, NSTS 22254, SPAR-RMS-PA.1067, SPAR-RMS.1068, DM-WI.037 & PE-PR.005
- 13.3 **CONTENTS:**
 - (a) General. The Safety Plan shall be documented in narrative format and shall:
 - (1) Describe the scope of the project for which the safety engineering activity is to be tailored.
 - (2) Describe any interrelationships to other contract requirements, tasks and functional elements including appropriate cross references to minimize duplication.
 - (3) List the contractor and NASA documents which will be applied either as directives or as guidance in the conduct of the Safety Plan and related system safety tasks.
 - (4) Identify the system safety engineering requirements, tasks, and responsibilities on an item-by-item basis in accordance with the schedule.
 - (b) Safety Engineering Organization. The Safety Plan shall describe:
 - (1) The system safety organization or function within the organization of the contract including charts to show the organizational and functional relationships and lines of communication.
 - (2) The responsibility, authority, and accountability of system safety personnel and other contractor organizational elements (including subcontractors) involved in the system safety effort. Identify each organizational unit responsible for

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executing each task. Identify the authority in regard to resolution of all identified hazards. Include the title, address, and telephone number of the System Safety Program Manager.

(3) The staffing of the system safety organization for the duration of the project including manpower loading and qualifications of assigned key personnel.

(4) The procedures by which the contractor will integrate and coordinate the system safety efforts. Include methods of dissemination of system safety requirements to action organizations and Subcontractors; coordination of subcontractors' system safety programs; integration of hazard analyses; Management and engineering reviews; program status reporting; and the identities and charters of any system safety groups.

(5) The process through which contractor management decisions will be made to include notification and subsequent actions for the following: critical and catastrophic hazards; corrective actions taken; mishaps or malfunctions; waivers to safety requirements; and program deviations.

(6) The interfaces between the system safety organization and all other applicable disciplines such as Engineering, Occupational Safety and Health, Reliability, Quality Assurance, Medical Support, etc., at all levels of the project (NASA, contractor, and subcontractor.)

(c) Safety Project Milestones. The Safety Plan shall:

(1) Identify safety milestones required to accomplish evaluations of the effectiveness of the system safety effort at critical safety checkpoints (such as design reviews, self-evaluations, operational readiness reviews, audits, etc.)

(2) Provide a contract schedule of safety tasks showing start and completion dates, reports, reviews, and man loading, in relationship to other contract milestones.

(3) To preclude duplication, identify integrated system activities (i.e., design analyses, test demonstrations, etc.) applicable to the system safety program but specified within other engineering tasks. Include as part of this section the estimated system safety manpower loading required to accomplish these integrated tasks.

(d) Safety Requirements. The Safety Plan shall:

(1) Describe or reference the methods that will be used to identify and apply hazard control requirements and criteria for the design and operation of equipment, software, and facilities, and for procedures covering all phases of acquisition specified in the schedule. List the safety standards and system specifications which are the sources of safety requirements with which the contractor either is required to comply or intends to adopt as a requirement.

(2) Describe the risk assessment procedures including the hazard severity categories, hazard probability (or frequency) levels, the precedence to be followed in satisfying safety requirements. State any qualitative or quantitative measures of system safety which the contractor is required to meet, including a description of the acceptable risk levels. Include system safety definitions which are in addition to those in JSC documents or are unique to the project covered by the Safety Plan.

(3) Describe the management controls that shall be used to ensure compliance or justify waivers and deviations with general design and operational safety criteria and the closed loop procedures to ensure hazard resolution and control.

(e) Hazard Analyses. The Safety Plan shall describe:

(1) The analysis techniques and format that will be used in qualitative and quantitative analysis to identify hazards, their causes and effects, and recommended corrective actions.

(2) The depth to which each analysis technique will be used within the system, operation, or scenario being analyzed. This description will include identification of hazards associated with the system, subsystem, components, personnel, support equipment, government furnished equipment, facilities, and their interrelationships in the logistics support, training, maintenance, transportability, operational environments, and phase out or disposal.

(3) The integration of subcontractor hazard analyses and techniques within the overall project including contractor hazard analyses.

(4) The techniques to be used to establish a single closed loop tracking system.

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- (f) Safety Data. The Safety Plan shall:
 - (1) Describe the approach for researching, disseminating, and analyzing pertinent historical hazard or mishap data.
 - (4) Identify deliverable data and the level of approval required for customer acceptance. Attach a copy of the appropriate sheets from the data requirements list (DRL) of the schedule.
 - (5) Identify safety related non-deliverable data and describe the procedures for accessibility by NASA and the retention of data.
- (6) Safety Verification and Audits. The plan shall describe:
 - (7) The verification and audit requirements and procedures for ensuring that the objectives and requirements of the system safety program have been adequately demonstrated and implemented.
 - (8) The procedures for ensuring feedback of safety-pertinent information for management and engineering review and analysis.
 - (9) The review procedures established by the contractor's system safety organization to ensure safe conduct of hazardous tests with particular emphasis on those involving human test subjects.
- (g) Training. Describe techniques and procedures to be used by the contractor to ensure that the objectives and requirements of the system safety program are implemented in training for engineers, test subjects, technicians, operators, and support (including maintenance) personnel.
- (h) Safety Review Process.
 - (1) The safety process shall be based on the hardware design and development schedule. Hardware and safety engineers will work all safety issues associated with the hardware. Safety analysis begins at the hardware's concept phase and continues through the life cycle of the hardware.
 - (2) For Prime Contractor integrated hardware items, the safety process will include safety data deliveries to the Prime in support of the Safety Review Panel (SRP) and Incremental Design Review (IDR) flight group schedules. The Prime will perform the integrated safety analysis for this hardware and present the integrated safety analysis to the Safety Review Panel (SRP).
 - (3) For Non-Prime hardware items, phase safety data packages will be delivered 45 days prior to a scheduled SRP meeting.
- (i) Phase 0 Safety Process
 - (1) A Phase 0 Safety Review may be conducted after the Concept Design Review. The hardware and safety engineers will identify the applicable safety requirements and estimate the level and amount of documentation needed with a documentation deliverable schedule. A formal SRP presentation is not required, but may be beneficial for complex hardware items.
- (2) Phase I Safety Process
 - (3) Prior to the Phase I Safety Review and the Preliminary Design Review (PDR), the hardware and safety engineers will identify all potential inherent hazards, fault hazards, operational hazards and causes for hazards associated with the hardware. The hazards will then be assessed for severity and likelihood as defined in NSTS 22254 and SSP 30309. Low severity hazards (category III and lower) will result in documentation in the SAR. High severity hazards will be identified in the SAR with a formal hazard report written. Controls for hazards will be employed with preliminary methods identified to verify all hazard controls.
 - (4) At the PDR, when approximately 10% of the design is complete, all potential hazards, causes and effects will be documented. Review item discrepancies will be written when safety requirements have not been met or adequately controlled. The RID board will disposition the RIDS and determine if any design change solution is available.
 - (5) Once any changes from the RIDS and other comments have been incorporated, the SAR and HRs will be taken by the hardware engineer and the safety engineer to be reviewed by the ISS SRP or the Shuttle System Safety Review Panel (SSRP). The ISS SRP and the Shuttle SSRP have final signature authority for acceptance of the hazard reports for the Phase I level of maturity

DRD CONTINUATION SHEET

TITLE: System Safety Plan

DATA TYPE: 2

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- (6) The hardware engineer will continue with the design process for the hardware and perform the necessary iterations of the hazard analysis as the design matures.
- (j) Phase II Safety Process
- (1) The Phase II Safety Review is conducted after the Critical Design Review (CDR) when approximately 90% of the design is complete.
- (2) The SAR and HRs shall be completed so that:
- (3) All system level, assembly, operational and interface hazards, and hazard causes have been identified;
- (4) A means for eliminating, reducing, or controlling the risk has been defined and implemented; and
- (5) Specific verification methods have been finalized.
- (6) The hazard reports will be formally presented during the CDR presentation. Verification test procedures related to hazard controls and retention rationale will be reviewed as well.
- (7) The RID board will disposition new RIDS and determine if any design change solution is available. Once any changes from the RIDS and other comments have been incorporated, the SAR and HRs will be taken by the hardware engineer and the safety engineer to be reviewed by the ISS SRP or the Shuttle SSRP.
- (8) The ISS SRP and the Shuttle SSRP have final signature authority for acceptance of the hazard reports for the Phase II level of maturity.
- (k) Phase III Safety Process
- (1) The Phase III Safety Review is accomplished after the Design Certification Review (DCR). The safety analysis and safety verification activities should be complete for the hardware to allow safety certification and program management acceptance.
- (2) The hardware engineer, safety engineer, and the appropriate review panel approves the hardware certification report, and signs off the completed safety documentation.
- (3) The hardware engineer is responsible for the technical content, the S&MA engineer verifies the information is correct, and the review panel provides the management signature.
- (l) Appendices
- (1) Safety Analysis Report (SAR): See DRD 16 on "SARs."
- (2) Software Safety Analysis Report (SSAR): See DRD 30 on "SSARs."
- (3) Hazard Report (HR): See DRD 16 on "HRs."
- (4) Mishap and Corrective Action Reports: See DRD 10, Safety and Health Plan

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 16
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Shuttle Safety Analysis Report (SAR) and Hazard Report (HR)[HR_1] and Station Hazard Reports (SHR)
7. **DESCRIPTION/USE:** The HRs and SHRs are used to provide Shuttle and ISS Program Management, respectively, with an assessment of the change in program risk resulting from the introduction of, or modification to, the system in question. The SAR is used to provide supporting documentation of the safety analysis for Shuttle flight hardware.
The JSC Safety Engineering Review Panel (JSERP) will use the HRs to assess design and operation of Shuttle flight hardware. The ISS Safety Review Panel (SRP) will use the SHR to assess the design and operation of ISS flight hardware.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Initial at Preliminary Design Review.
10. **SUBMISSION FREQUENCY:** Updates provided at subsequent milestone reviews and as required
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 13, 14, 22, 30
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, JSC 17481, NSTS 5300.4 (1D-2), NSTS 22254, SPAR-RMS-PA.1068, SPAR-RMS-R.085, PE-PR.047, PE-PR.024, PE-PR.029, PE-PR.030 & PE-PR.038, SSP 30309; SSP 30599
- 13.3 **CONTENTS:**
 - (a) Scope:
A SAR and HRs are applicable to all Shuttle flight hardware. SHRs are applicable to all ISS flight hardware.
 - (b) Contents:
The hardware provider shall provide the SAR and HRs for program management visibility. SHRs and System Descriptions shall be provided that are commensurate with the level of maturity of the design in accordance with SSP 30309.
SAR: A safety analysis shall be performed in accordance with NSTS 22254 and a SAR shall contain the following as a minimum:
 - (1) System, subsystem, assembly, or item identifier
 - (2) Event and mission phases considered.
 - (3) Page, date, and revision number.
 - (4) Identification of the preparer and approvals with signatures.
 - (5) Description of the type of hazard analysis performed.
 - (6) Analysis of each generic hazard listed in JSC 17481 and unique hazards showing applicability or inapplicability, controls, and verifications.

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TITLE: Shuttle Safety Analysis Report (SAR) and Hazard Report (HR)[HR_1] and Station Hazard Reports (SHR)

DATA TYPE: 1

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- (7) Safety matrix relating equipment subsystems to generic hazards.
- (8) Hazard list providing HR number, title, status, and classification for any baselined hazards.
- (9) Summary of open HRs with actions required for closure.
- (10) Summary of candidate accepted risks with acceptance rationale.

The SAR may be sufficed by a properly and completely filled out hazard analysis worksheet or Board Certification Approval Request (CAR) in situations where the system, subsystem, assembly, or item is non critical, low cost, and not complex in design.

(c) HR. If Shuttle HRs are required based on the safety analysis performed, the HRs shall comply with the requirements of NSTS 07700 Volume V and NSTS 22254. The HRs shall contain, by attachment, documentation of work performed to support closure. A suggested format is provided, and available on Jeeves. Other formats are acceptable provided all HR data elements are included.

(d) SHR: ISS SHRs shall be in accordance with SSP 30309

13.4 **FORMAT:** SAR and HRs shall be in accordance with NSTS 22254 "Methodology for Conduct of Space Shuttle Program Hazard Analyses". Space Station SHR and System Description shall be in accordance with SSP 30309. For Software Safety Analysis Report (SSAR) see DRD 29 on SSAR

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 17
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Test Procedures
7. **DESCRIPTION/USE:** Test Procedures describe the step-by-step procedure for each test identified in the test plan to verify the system to the requirements specifications.
9. **INITIAL SUBMISSION:** As required.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 14, 18, 32, 33
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.3.3.2, DM-WI.037, PE-PR.005
- 13.3 **CONTENTS:**
 - (a) Test Procedures shall contain as a minimum:
 - (1) Brief overview of the system to be tested.
 - (2) Test equipment required.
 - (3) Preparation instructions.
 - (4) Detailed step-by-step test procedures including inputs and outputs or test data to be collected (along with collection methods).
 - (5) Pass/fail criteria for each step or test.
 - (6) QA/QC surveillance and problem reporting procedures.
 - (7) Safety instructions.
 - (8) Handling instructions.
 - (9) Pre and post-test inspection procedures.
 - (b) Test procedures for acceptance test of end item flight articles are considered Class I documents and require NASA approval prior to commencement of tests as well as NASA approval of changes.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 18
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Acceptance Data
7. **DESCRIPTION/USE:** Acceptance Data provides complete deliverable unit documentation at the time of acceptance of the Contract End Item (CEI). The purpose of this instruction is to establish the minimum requirements for the data to be available for review prior to acceptance and delivery of each contracted item. Data provides a chronological history of the equipment configuration and quality status and will be available at all times, from initial preparation during activities leading to delivery, through the life of the hardware. The Acceptance Data Packages will be submitted as an electronic copy and will be available through the program's data and configuration management system (Jeeves).
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Two weeks prior to Acceptance Review.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 14, 15, 17, 20, 22, 32
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.3.3, SSP 30695, MDA DM-PR.010 & DM-PR.011
- 13.3 **CONTENTS:**
 - (a) Information included in this DRD may be a combination of data and electronic types with all records residing and being available through the program's data and configuration management system (Jeeves). Records and data are required to be linked or referenced based on specific hardware deliverable configuration at time of acceptance so that all data will be available and provide a continuous record of all aspects of the hardware configuration.
 - (b) This DRD applies primarily to functional flight hardware systems and subsystems. Requirements for software systems (which are not part of flight hardware) or non-flight ground systems (containing both hardware and software) will be determined as part of project definition and deliverable requirements based on current NASA requirements and type of deliverable.
 - (c) Index:
An index or inventory of the acceptance data content items along with a brief description of each item included, and a negative statement if an item is not applicable to that specific shipment.
 - (d) Component/Equipment Historical Logs: During the acceptance testing and inspection, a log (JSC Form 772, System and Component Historical Record, or equivalent) will be maintained to continuously document the history of the item or component. Each log will be chronologically maintained and will account for all periods of time, including idle time and movements of the item. Entries will be complete and self-explanatory and will reference the test and test results, configuration changes, special inspections, etc. The Quality Assurance Representative will validate all entries.

DRD CONTINUATION SHEET

TITLE: Acceptance Data

DATA TYPE: 2

DRD NO.: 18

PAGE: 2/2

(e) Engineering Drawings: Engineering drawings must be complete to the extent necessary to document hardware configuration and perform receiving inspection, as well as any test or operation to be performed at the destination.

(f) As-Delivered Configuration: Includes information supplemental to the engineering drawings such as final dimensions, weight, serial Numbers, dash numbers and explanation of unique characteristics associated with the dash number, and any Other information specific or unique to the hardware being delivered that would affect its usage or Interchangeability with other units in the field.

(g) Parts List: Indented parts list with traceability information, listing all parts and materials comprising the Deliverable.

(h) Inventory of Serialized Components:

A list of serialized components containing the following:

(1) Component part number

(2) Component name

(3) Component serial number

(i) Non-Standard Part Approval (Requests) (NSPAR): References to any applicable NSPARs.

(j) Material Usage Agreements (MUAs): References to any applicable MUAs.

(k) Waivers/Deviations: Waivers/deviations applicable to this item and references of NASA approval documentation. For Government-Furnished Equipment (GFE), this information may be included in the JSC Form 772, System and Component Historical Record, or equivalent.

(l) Discrepancy Reports (DR's)/Material Review Board (MRB) Actions: All Class I MRB actions and DRs pertinent to the CEI or component being shipped.

(m) Record of Limited Life/Time and Cycle Usage: A list of limited life and critical time/cycle items will be maintained and updated for acceptance of deliverable items. Records will be maintained and updated for acceptance of relevant time/cycle usage.

(n) System Requirements, Test Requirements, and Test Procedures: Identification of all documents used to establish system requirements (performance, interface, etc.), test requirements (including sources of the requirements), and test procedures. Documents specific to the deliverable (requirements, specifications, plans, procedures, etc.) are to be included with the acceptance data. All applicable documents listed should include:

(1) Document Number

(2) Revision Level (along with any applicable unincorporated changes or ECNs)

(3) Document Title

(o) Test Results: Test results and reports detailing the methodologies, test objectives, tests performed, all recorded performance data and test results. Includes test equipment used, test equipment configuration, and any information specific to test equipment preparation and usage during testing. Results and reports are to include information, data, and conclusions obtained from simulations and/or analyses conducted or performed as part of acceptance activities including unit and system FMEA/CILs and SARs.

(p) Additional Requirements:

In addition to the above requirements, the Technical Manager may require certain other specific data or items of information related to the project.

13.4 **FORMAT**: In the contractor's format.

13.5 **MAINTENANCE**: Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1

ISSUE: BASIC

2. **DRD NO.:** 19

3. **DATA TYPE:** 3

4. **DATE REVISED:**

6. **TITLE:** Limited Life Item List
7. **DESCRIPTION/USE:** Identify and control limited-life items.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Acceptance Review.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 18, 26
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, NSTS 5300.4 (1D-2), JSC 17057, SPAR-RMS-R.116, MDA-RMS-R.7709, SPAR-RMS-PA.005, SPAR-RMS-R.135, MDA-STD-M.7823, PE-PR.034, PE-WI.096 & PE-PR.047
- 13.3 **CONTENTS:**
 - (a) **Scope:** Identify time/cycle-sensitive components and age-controlled items and related requirements for Inspection, maintenance, and replacement of these items. Limited-life items include limited-shelf life, Limited-operating life, time-action control sensitive items, or a combination of these. Maintain time/cycle Historical log evaluation of accrued time to determine remaining life.
 - (b) **Format:** Electronic tables for entry into NASA databases.
 - (c) **Content:**
 - (1) Items shall be identified by part name and number, life limit, life limiting parameter, or part/material; its function; any limitations on number of refurbishment's; and any data related to operational use, test, handling, or inspection.
 - (2) Requirements for maintenance of historical equipment data and records to verify that time/cycle- and age-sensitive items are controlled within acceptable limits. Entries to the equipment data records shall be complete and self-explanatory, and shall include, but not be limited to, the following:
Part Data:
Shuttle & Station:
 - LRU/SRU Part Name
 - LRU/SRU Part Number
 - Location of Limited Life Item within LRU and SRU
 - Expected Service Life, Including Duty Cycle
 - Serial number
 - Date of manufacture
 - Time (age) limit/cycle limit

DRD CONTINUATION SHEET

TITLE: Limited Life Item List
DATA TYPE: 3

DRD NO.: 19
PAGE: 2/2

Station only:

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- Cage Code
- Shelf Life Quantity
- Shelf Life Units
- Life Limiting Parameter
- Material
- Function
- Limitation of Refurbishment's
- Restrictions

Part instance limited-life data:

- Next higher assembly part number
- Part instance location code
- Part instance Logistics Control Number (LCN)
- Life-limit cycles
- Life-limit mean time between failures
- Mean time between failure units (e.g., hrs.)
- Beginning of life-limit accrual criteria
- Part instance "birthday"

Serialized Part Life Accrual Data:

- Next higher assembly part number
- Part instance location code
- Part instance Logistics Control Number (LCN)
- Accrued cycles
- Accrued In-service Time
- Date/Time of last accumulation
- Projected cycles remaining
- Projected life remaining
- Absolute life end date

(d) The status reports shall include the accrued time and cycles for each item by part and/or serial number, location, and remaining life.

(e) Waiver reports are required to document instances where an item has exceeded its time/cycle limit and rationale for accepting an item for flight or in support of flight. The waiver shall include item name, number, serial number, time or cycle limit, reason the item has (or will) exceed its time/cycle limit, and contractor rationale for accepting the item for flight or proposed action.

(f) The Limited-Life Items List data requirements applies to all flight hardware. For Station, Limited-Life Items List data must be accessible in the Vehicle Master Database (VMDB) 145 days prior to the IDR that covers the first flight deployment of the hardware. The VMDB is maintained by NASA JSC.

(g) Maintenance: Update as required.

(h) Note: Multiple deliveries of the GFE do not require corresponding data deliveries.

13.4 **FORMAT**: In the contractor's format.

13.5 **MAINTENANCE**: Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 20
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** End Item Shipping Documentation Package
7. **DESCRIPTION/USE:** Documentation included in hardware delivery to NASA which identifies deliverable and transfers property accountability.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** One week prior to hardware ship date.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 02, 03, 04, 05, 06, 18
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, C.1.3.3.2, C.1.3.3, C1.3.3.6.10, MDA-RMS-VDD.2784, MDA-RMS-SG.2630, DM-PR.011, PE-PR, 047
- 13.3 **CONTENTS:**
 - (a) DD Form 250/1149 (or other Government recognized "shipper" document, such as JSC Form 290), with quality control validation, will be required for all shipments. The shipper document will indicate nomenclature, part number, serial number, and quantity of hardware shipped.
 - (b) **For Non-Functional Items**

A suitable inspection status tag, JSC Form 911 or equivalent, will accompany all nonfunctional items. This tag will contain, as a minimum, the following information:

 - (1) Acceptability (for its intended use)
 - (2) Identification by part number and serial number
 - (3) Indication of Government acceptance
 - (4) Cleanliness certification
 - (5) Proof pressure loading certification (if applicable)
 - (6) Material certification (if applicable)
 - (c) **For Functional Items**
 - (1) **Engineering Drawings** - Complete and to the extent necessary to perform receiving inspection and any test or operation to be performed at the destination.
 - (2) **Non-flight or Temporarily Installed Hardware** - An itemized list of all non-flight or temporarily installed hardware. Such hardware will be suitably identified and logged to control the use and final removal. Serialized streamers will be attached to all non-flight items not requiring physical removal to complete flight installations except when the streamer might damage hardware.
 - (3) **Certification of Compliance** - Certificate of Compliance stating article compliance with the specifications and requirements of the contract.

DRD CONTINUATION SHEET

TITLE: End Item Shipping Documentation Package

DRD NO.: 20

DATA TYPE: 1

PAGE: 2/2

(4) Certification of Cleanliness - Certification describing the level to which the hardware has been cleaned and packaged.

(5) Additional Requirements - In addition to the above requirements, the Technical Manager may require certain other specific data or items of information related to the project.

(d) Note

All documentation contained within this DRD will be available electronically within the program's data and configuration management system (Jeeves). The End Item Shipping Documentation Package is derived from the Acceptance Data Package, which is electronically available within the program's data and configuration management system (Jeeves).

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 21
3. **DATA TYPE:** 3
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Commercial Off-the-Shelf Manuals and Documentation (COTS)
7. **DESCRIPTION/USE:** To describe the delivered hardware and software for the purpose of operation and maintenance.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** With hardware/software delivery.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRD 20
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.3.3.2, SPAR-RMS-PA.2356, MDA PE-PR.024, PE-PR.040 & MDA-STD-M.7878
- 13.3 **CONTENTS:**
 - (a) The Contractor shall supply those manuals and other product documentation deemed necessary to operate the delivered equipment and software.
 - (b) Manuals and other documentation may be supplied in the source vendor format. On-line manuals supplementing hard-copy manuals are preferred.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 22
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Problem Reporting and Corrective Action (PRACA) for Johnson Space Center (JSC) Government Furnished Equipment (GFE)
7. **DESCRIPTION/USE:** To report problems and to document their subsequent resolution and approval.
8. **DISTRIBUTION:**
 - (a) Reports shall be sent to: JSC PRACA Center, Mail Code NT--4, Johnson Space Center, 2450 NASA Parkway, Houston, TX 77058
 - (b) Email (preferred): Primary: gfepraca@jsc.nasa.gov/ cc: terry.l.miller@-nasa.gov
 - (c) Voice: (281) 335-2340
9. **INITIAL SUBMISSION:** Within 5 business days after isolation to a configuration item but no later than 10 business days after occurrence/detection.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** Nonconformances requiring JSC GFE PRACA reporting are defined in JSC 28035. PRACA reporting is limited to flight equipment, equipment that is representative of flight equipment (flight-like) and critical ground support equipment.
- 13.2 **APPLICABLE DOCUMENTS:** JSC 28035, NSTS 22206, SSP 30234
- 13.3 **CONTENTS:**
 - (a) The following data is mandatory for the initial reporting of a problem. The initial report shall be transmitted to the JSC PRACA Center within 5 business days after isolation to a configuration item but no later than 10 business days after occurrence/detection.
 - (1) PRACA Number [a unique tracking number assigned to the PRACA report]
 - (2) Nonconformance Number [a unique local nonconformance number]
 - (3) Detect Date [The date (mm/dd/yyyy) nonconformance occurred or was detected]
 - (4) Location [The location where the nonconforming item was at, at the time of occurrence/detection]
 - (5) Program [The affected NASA program (SSP, ISS, or both)]
 - (6) Project Office [The responsible NASA Project Office (EVA, FCE, Life Sciences, Orbiter, RMS, Other_____)]
 - (7) Contact [The technical point of contact, organization, and phone number]
 - (8) Report Date [Date the PRACA report was initiated]
 - (9) Detected During [The specific test or operation performed when the nonconformance occurred]
 - (10) Title [A brief, but descriptive, title for the problem]
 - (11) Description [A narrative description of the problem including the observed event(s) as well as the expected event(s).]
 - (12) Identification of the Configuration Item by:

DRD CONTINUATION SHEET

TITLE: Problem Reporting and Corrective Action (PRACA) for Johnson Space Center (JSC) Government
Furnished Equipment (GFE)

DRD NO.: 22

DATA TYPE: 1

PAGE: 2/2

- (a) Part name
- (b) Part number
- (c) Serial number, lot number, or version
- (d) Manufacturer's name
- (13) Manufacturer's Contractor and Government Entity (CAGE) code

(b) The following data shall be provided when it becomes known (with the exceptions noted). This data shall be provided as updates to the initial PRACA report. This data is mandatory for the closure of the report. The end item (if not the configuration item), specific subassemblies, and the nonconforming article shall be identified:

- (1) Part name
- (2) Part number
- (3) Serial number, lot number, or version
- (4) Manufacturer's name
- (5) Manufacturer's CAGE code
- (6) FMEA No. [Failure Mode and Effects Analyses number. Note: if the hardware is used by the Space Station and the Space Shuttle Programs, provide both FMEA numbers.]
- (7) FMEA Criticality [criticality per NSTS 22206 or SSP 30234. This data is required within 10 calendar days of opening the problem report. Note: if the hardware is used by the Space Station and the Space Shuttle Programs, provide both FMEA criticalities.]
- (8) FMEA/CIL Impact [yes or no, is the FMEA/CIL retention rationale impacted by the occurrence of this problem?]
- (9) Out-of-Family Problem [yes or no, based on the definitions of In-Family and Out-of-Family in JSC 28035.]
- (10) Fracture Critical [yes or no, is the material involved fracture critical?]
- (11) ECD [Estimated Completion Date for submitting a final closure of the problem. This data is required within 30 calendar days of opening the problem report.]
- (12) Process Escape [yes or no, per the definition of process escape in JSC 28035]

(c) The following data shall be provided to close the report:

- (1) Final report [A final report documenting the specific information required for closure per JSC 28035, i.e. final closure with corrective action (this is preferred) or final closure without corrective action (explanation)]
- (2) Approval signatures
- (3) Date Approved

(d) The contractor shall maintain a status list on all open problems including estimated completion date. This status shall be submitted to the Contracting Officer's Technical Representative and the JSC PRACA Center on a monthly basis during the contract.

13.4 **FORMAT:** The contractor's format is acceptable; however, data shall be easily identifiable to the data labels specified in Contents. JSC Form 2174 is a preferred document for initiating problem reports.

13.5 **MAINTENANCE:** Update as required.

DATA REQUIREMENTS DESCRIPTION (DRD)

- | | | | | |
|----|--------------|--------------|----|---------------|
| 1. | DRL NO.: 1 | ISSUE: BASIC | 2. | DRD NO.: 23 |
| 3. | DATA TYPE: 2 | | 4. | DATE REVISED: |

5. **PAGE:** 1/2

6. **TITLE:** Engineering Change Notices (ECNs)
7. **DESCRIPTION/USE:** To request changes to NASA approved baseline design, requirements, documentation, and interfaces for both hardware and software.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** As required.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.2, PE-PR.047, DM-WI.047, DM-WI.015, DM-WI.020
- 13.3 **CONTENTS:**
 - (a) ECNs should provide engineering information and other data on the proposed change to baseline in sufficient detail to support both the technical evaluation and change impact assessment. ECNs shall contain, as a minimum, the following information:
 - (1) Technical description of the proposed change.
 - (2) Part and serial numbers affected.
 - (3) Effects on existing specifications, assembly drawings, ICDs, etc.
 - (4) Changes in fit, form, function, or performance.
 - (5) Software changes to logic, design, or mathematical formulation.
 - (6) Impacts on other components or subassemblies.
 - (7) Impacts on other projects or spares inventories.
 - (8) Impacts on safety, reliability, quality, and maintainability.
 - (9) Impacts on weight.
 - (10) Impacts on schedule.
 - (11) Impacts on cost.
 - (b) Classification of Change:
 - (1) Class I Change:
 - (i) Affects any of the categories listed in 2 through 11 above.
 - (ii) Requires NASA approval of proposed change prior to implementation.
 - (2) Class II Change:
 - (i) Does not affect any of the categories listed in 2 through 11 above but does require change to NASA approved baselined design or document.

DRD CONTINUATION SHEET

TITLE: Engineering Change Notices (ECNs)
DATA TYPE: 2

DRD NO.: 23
PAGE: 2/2

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(ii) To be released internally and then submitted to NASA for concurrence on change classification.

(iii) Class II ECNs are submitted for customer concurrence in classification per the agreed program requirements, if required by contract.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 24
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Materials and Processes (M&P) Summary Report and Material Usage Agreement (MUA)
7. **DESCRIPTION/USE:** For NASA review and approval of all material usage's and components which do not comply with Contractual specification requirements.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary Design Review.
10. **SUBMISSION FREQUENCY:** Updates at subsequent milestone reviews and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 09 and 18
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, C.1.3.3.3, SP-R-0022, SE-R-0006C, JSC 09604, JSC 28035, NASA-STD-6001, SSP 30558, MSFC-HDBK-527/MAPTIS, PE-PR.034
- 13.3 **CONTENTS:**
 - (a) The Materials and Processes (M&P) Summary Report. All materials and processes used in the fabrication of hardware shall be identified on Engineering Drawings and other design documentation by specifications and/or process standards. These shall be selected from Military, Government and Industry standards, except that NASA documents shall be preferred over others, when available and appropriate. In the event the information on materials formulation is considered proprietary, vendor information, history of past use and rationale for selection shall be available for review in addition to the above.
 - (b) For existing designs, new Material Usage Agreements (MUAs) need not be generated. For new designs, an M&P summary report detailing the materials and processes used including their applicable procurement specifications. Where new materials or processes are used which do not meet the requirements of this document, MUAs with proper supporting rationale shall be prepared and submitted for approval. MUAs shall contain sufficient information on materials proposed for use necessary for evaluation, including photographs, sketches, and rationale (as appropriate) for usage acceptability, on a NASA-approved form.
 - (c) The Form shall be dated, signed by the program manager, and submitted to NASA for approval prior to use on the program.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 25
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Non-Standard EEE Part Approval Requests (NSPARs)
7. **DESCRIPTION/USE:** To identify and provide rationale for approval to use Non-Standard EEE parts.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary Design Review.
10. **SUBMISSION FREQUENCY:** Updates at subsequent milestone reviews and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRD 34
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, MDA-RMS-PA.2533, PE-PR.047 & PE-WI.007
- 13.3 **CONTENTS:**
 - (a) Non-Standard Part Approval Requests (NSPARs) for EEE parts shall be supplied by the Contractor for permission to use EEE parts that are:
 - (1) not procured from a standard parts list (e.g. NASA or Military Specification),
 - (2) not procured from the designated approved source
 - (3) used in applications outside of the parts' specifications
 - (4) used outside of the Part Application Analysis (PAA) derating requirements.
 - (b) NSPARs are to be used for Level A hardware. They are not required for Levels B and C hardware. If the non-standard part is an Off-The-Shelf (OTS) part, a NSPAR is not required. See DRD 32.
 - (c) NSPARs shall, as a minimum, contain the following information:
 - (1) NSPAR Identification – NSPAR Reference number, Subcontractor reference number, Type (EEE or Mechanical), and Category (non-standard or non-compliant),
 - (2) Assembly Identification – equipment name, function and criticality, part number, serial number and description, supplier/subcontractor.
 - (3) Part Identification - Part name, part number, type and common designation (closest standard and commercial equivalents), specification number, manufacturer's name, location and CAGE Code.
 - (4) Application Data – quantity used, anticipated operating environment(s), worst case stresses,
 - (5) NSPAR Originator details – job title, company, telephone number, date raised and date required.
 - (6) Qualification status and basis of qualification.
 - (7) Limited list (yes, no).
 - (8) Justification for use of the part including technical adequacy, complete with a list of supporting documentation attached.

DRD CONTINUATION SHEET

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TITLE: Non-Standard EEE Part Approval Requests (NSPARs)
DATA TYPE: 2

DRD NO.: 25
PAGE: 2/2

(d) When a limited life item is affected, the Contractor shall ensure that proper changes are made to limited life control lists.

(e) NSPAR must be reviewed and signed by EEE parts specialists from both the originating company and the Contractor.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 26
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Waiver/Deviation Approval Requests
7. **DESCRIPTION/USE:** To submit written requests for acceptance of non-conformances.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary Design Review.
10. **SUBMISSION FREQUENCY:** Updated at subsequent milestone reviews and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 09, 18, 19
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, C.1.3.3.5.6, PE-PR.047, DM-WI.037 & PE-PR.005
- 13.3 **CONTENTS:**

(a) Waiver/Deviation requests shall be prepared and submitted to NASA JSC for review and acceptance of Non-conformances. A waiver is requested to authorize use or acceptance of hardware or software which does not meet specified requirements. A waiver is requested after the fact. A deviation is requested to authorize departure from particular requirements of specifications or related documents. JSC Form 84, Waiver/Deviation Approval Request, or an approved contractor form shall be used. Each waiver/deviation request shall contain as a minimum:

 - (1) Identification of the request as a waiver request or a deviation.
 - (2) Equipment name, part number, applicable serial numbers, function and criticality, and effectivity, and flight effectivity if applicable.
 - (3) Identification of the requirement to be waived or deviated from.
 - (4) The name, part number, serial number, and function of affected components, and the component manufacturer.
 - (5) Salient differences between the design baseline and the requested configuration.
 - (6) Effect of failure of the requested change.
 - (7) Technical justification, including impact, supporting approval of the request.
 - (8) The contractor's reliability evaluation of the request.

Affected processing, testing, acceptance, or shipment of applicable hardware or software shall not proceed until notification of NASA approval of the waiver/deviation.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 27
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Shuttle Remote Manipulator System (SRMS)(Board) Certification Approval Request (SRMSCAR) and Government Certification Approval Request (GCAR)
7. **DESCRIPTION/USE:** The SRMSCAR is the approval form for Shuttle flight hardware certification. The GCAR is the approval for the acceptance and certification for Station flight hardware.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Acceptance Review.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, PE-PR.034, SSP 30558, SPAR-TM.1412
- 13.3 **CONTENTS:**
 - (a) The SRMSCAR, with attached documentation, meets the information requirement for a (Board) Government Certification Approval Request (GCAR) as submittal and approval of the hardware certification. The SRMSCAR may serve as the certification report, when agreed and approved by NASA JSC, when a formal certification report document is not submitted. The SRMSCAR may also serve as the Certification Requirements (CR), commonly documented in the program requirements document and the certification plan, when pre-approved as such.
 - (b) All sections shall be filled out unless they are marked N/A. As used in the SRMSCAR, "Test" document shows the test was done and verified. All documents listed in the SRMSCAR as verification of a requirement or specification must be attached to the SRMSCAR as part of this certification report.

Addendum:

- (d) Shuttle Remote Manipulator System (SRMS) Materials and Fracture Control Certification (attached) Instructions. The form is to be used in conjunction with the Shuttle Remote Manipulator System (SRMS) Board Certification Approval Request (SCAR) and submitted to NASA/JSC.
- (e) This form has been created to provide NASA/JSC certification of compliance with:
 - (1) Materials and Process Requirements;
 - (2) Fracture Control Requirements.
- (f) This document will be signed electronically, prior to submission to NASA, by the following contractor's desk officers:

DRD CONTINUATION SHEET

TITLE: Shuttle Remote Manipulator System (SRMS)(Board) Certification Approval Request (SRMSCAR) and Government Certification Approval Request (GCAR)

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(1) Originator

(2) Materials Engineering

(3) Structural Engineering

(4) Product Assurance.

(g) The contractor's Subsystem Manager and JSC Program Manager NASA/JSC will then complete the approval process.

(h) For additional information and instructions see <http://wwwsrqa.jsc.nasa.gov/gcars/>

(i) Preparation Information Station:

The GCAR is the form (JF 1296) that documents the certification for a flight item.

Form JF 1296 with instructions may be found at <http://wwwsrqa.jsc.nasa.gov/gcar/instructions.htm>

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 28
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Product Assurance Plan
7. **DESCRIPTION/USE:** To provide a plan covering all aspects of Product Assurance (PA) and how PA will be applied under this contract to comply with NASA requirements.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, PE-PR.047
- 13.3 **CONTENTS:**
 - (a) The plan shall establish the PA requirements for the contractor during design, development, production, test, verification and certification of hardware and/or software products. Where conflicts arise between contract requirements and the agreed PA process levels, contract requirements take precedence. The plan shall address the following PA functions and related processes:
 - (1) Safety
 - (2) Integrated Logistics Support
 - (3) Reliability
 - (4) Maintainability
 - (5) EEE and Mechanical parts
 - (6) Quality Assurance
 - (7) Materials and Processes Engineering
 - (8) Software
 - (9) Configuration management
 - (10) PA Records
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 29
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Software Deliverables
7. **DESCRIPTION/USE:** Specifies the software deliverables for Level A, Level B and Level C software.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:**
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C1.1.3.1.3, C1.3.3.5.3, PE-PR.073
- 13.3 **CONTENTS:**
 - (a) This document defines the approval, review and delivery requirements of software deliverables for Level A, Level B and Level C software.
 - (b) Ground Support Equipment (GSE) which does not directly interface to flight hardware shall conform to Level C software deliverables.
 - (c) Refer to the Software Deliverables matrix on the next page. The format and content of the deliverable documents are specified in the references.
 - (d) The balance of software Level A & B shall be defined by the change request.
- 13.4 **FORMAT:** In the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 30
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Software Safety Analysis Report (SSAR)
7. **DESCRIPTION/USE:** The Software Safety Analysis Report, applicable to Process Level A only, is used to document the safety analysis and mitigation activities performed on software, throughout the software's development life cycle.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary at Requirements Review.
10. **SUBMISSION FREQUENCY:** Updated at subsequent milestone reviews and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRDs 14, 15, 16
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, PE-PR.057, PE-WI.078
- 13.3 **CONTENTS:**
 - (a) A Software Safety Analysis Report (SSAR) is applicable where the System Hazard Report, or FMEA/CIL reports, attribute hazards to software elements of the system design. The relevant sections of the SSAR shall be reviewed and approved at Requirements, Design and Test Readiness Reviews.
 - (b) A software safety analysis shall be performed to assure the software components in the system that detect and control developing catastrophic hazards, or are contributors to the causes of those hazards (system safing, hazard detection loops). A SSAR shall contain the following, or functional equivalents, as a minimum:
 - (1) Software configuration item (CSCI) identifier
 - (2) Event and mission phases considered.
 - (3) Page, date, and revision number
 - (4) Identification of the preparer and approvals with signatures
 - (5) Identification of the System Hazard Report, and applicable FMEA/CIL Reports
 - (6) Description of the CSCI
 - (7) Listing of baselined hazards attributed to the CSCI, from System Hazard Report and applicable FMEA/CIL reports, providing Hazard identifier, status, and classifications.
 - (8) Description of the types of software safety analysis performed, at different phases of the software development life cycle. The minimum safety analysis required at each phase are identified below.
 - (c) Requirements Analysis phase
 - (1) Criticality Analysis
 - (2) Timing, Sizing and Sequencing Analysis
 - (3) A Review of the Validation Plan and Specification

DRD CONTINUATION SHEET

TITLE: Software Safety Analysis Report (SSAR)
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- (d) Design Phase
 - (1) Criticality Analysis
 - (2) Timing, Sizing and Sequencing Analysis
 - (3) Data Usage and Control Flow Analysis
 - (4) A Review of the BIT/BITE Design
- (e) Implementation and Test Phase Critical Analysis
 - (1) Timing, Sizing and Sequencing Analysis
 - (2) Complexity Analysis
 - (3) Data Usage and Control Flow Analysis
 - (4) A Review of the BIT/BITE implementation
 - (5) Verification Plan and Specification Review
 - (6) Safety Analysis of Changes
- (e) For each phase, document the analysis performed during the phase. Include any safety concerns, and the controls, verifications, and recommendations to mitigate the risk.
- (f) Summary of open issues with actions required for closure.
- (g) Summary of candidate accepted risks with acceptance rationale.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

- | | | |
|------------------------|--------------|-------------------------|
| 1. DRL NO.: 1 | ISSUE: BASIC | 2. DRD NO.: 31 |
| 3. DATA TYPE: 1 | | 4. DATE REVISED: |
| | | 5. PAGE: 1/2 |
6. **TITLE:** Reliability & Maintainability (R&M) Plan
7. **DESCRIPTION/USE:** Used to assure proper implementation of R&M quantitative requirements. Used by program management to verify predictions, allocations, etc., are consistent with program requirements.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRD 27
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C1.1.3.3.1, C.1.3.3.5.4, NHB 5300.4(ID-2), SPAR-RMS-PP.012, PE-PR.047 & MDA-STD-M.7823
- 13.3 **CONTENTS:**
- (a) Scope: Formulate an R&M Plan to serve as a master planning, program definition, and control document to govern the R&M quantitative-related activities required for the project.
 - (b) Format: Each quantitative requirement shall be addressed in narrative form and in sufficient detail to describe the philosophy and approach for implementation. Existing policies and procedures can be used if in total compliance with the requirements stated below.
 - (c) Contents: The plan shall identify and define the following as a minimum:
 - (1) The work to be accomplished for each applicable task.
 - (2) The time phasing and staff loading involved.
 - (3) The organizational element assigned responsibility and authority for implementing the required task.
 - (4) Lines of communication between the organizational element responsible for implementing the task and other interfacing organizational elements.
 - (5) Appropriate NASA-contractor program milestone review points.
 - (6) Method of control/s over subcontractor and vendor-related tasks.
 - (7) The purpose and expected results of each task. Planned methods for monitoring, assessing, reporting, and taking appropriate action regarding status, accomplishments, and problems.
 - (8) Specific techniques for allocating quantitative requirements to lower level functional elements of the system, subsystem, assembly, or components.

DRD CONTINUATION SHEET

TITLE: Reliability & Maintainability (R&M) Plan
DATA TYPE: 1

DRD NO.: 31
PAGE: 2/2

- (9) Specific techniques for making R&M predictions.
- (10) The method of data collection and analysis, and plan for ensuring an effective corrective action system.
- (11) Data base requirements.
- (12) Contents and submittal schedules of the prediction, allocation, assessment, and verification reports.
- (13) Means by which demonstration and verification will be accomplished.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 32
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Contract End Item (CEI) Specification and Verification Plan
7. **DESCRIPTION/USE:** To establish the joint JSC and hardware provider agreed upon requirements to be used for acceptance and certification of flight hardware.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** CEI Specification at System Requirements Review, Verification Plan at Preliminary Design Review.
10. **SUBMISSION FREQUENCY:** Updates at subsequent milestone reviews and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRD 27
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, SSP 30695, SPAR-RMS-PP.036, SPAR-RMS-TP.168, PE-PR.047; PE-PR.006 & PE-WI.029
- 13.3 **CONTENTS:**
 - (a) Scope:
 - (1) The CEI Specification addresses hardware and, if applicable, installed software definition, verification requirements, and acceptance and certification environmental requirements. These verification requirements apply to both the design certification and the acceptance testing of flight hardware.
 - (2) The Verification Plan defines the activities which are conducted to establish that the product conforms to the CEI Specifications and that it is free from manufacturing and workmanship defects. The Verification Plan is submitted for approval in the Preliminary Design Review time frame. The Verification Plan also contains the Requirements Verification Matrix which is then used to verify and document the hardware compliance to the established requirements. A copy of the Requirements Verification Matrix, with the column "Verification Documentation" listing the appropriate documentation (e.g. test document number, analysis document number, technical memo number, etc.), shall be completed and submitted as part of the SRMSCAR/Certification Package.
 - (c) Contents:

CEI Specification:

 - (1) Foreword. This includes, but is not limited to, the company or organization preparing the specification, for whom the specification is prepared (e.g. NASA Johnson Space Center), the contract number, project sub-task order number, and any other pertinent information.
 - (2) Abstract. Define the high level scope of the specification.
 - (3) Table of Contents
 - (4) Tables. List of tables and the associated page numbers.

DRD CONTINUATION SHEET

TITLE: Contract End Item (CEI) Specification and Verification Plan
DATA TYPE: 2

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- (5) Figures. List of figures and the associated page number
- (6) Acronyms. List the applicable acronyms and their explanation
- (7) Introduction. Discuss the purpose of the CARD and a description of the hardware. Include specific part numbers and dash numbers for the hardware being covered by the CARD. If available, include a line drawing of the hardware. All operational constraints for use of the hardware will be listed and explained in the section.
- (8) Applicable Documents. List the documents which apply to the hardware (e.g. program level documents, interface control documents, Safety and Mission Assurance documents, etc.).
- (9) Requirements. List the functional and performance requirements, both general and unique, for the hardware. Also, list any exceptions to existing requirements. The requirements establish the performance, design and verification requirements for the program and shall contain:
 - (i) Description of components and interfacing subsystems.
 - (ii) Performance, design, and construction requirements.
 - (iii) System interface requirements.
 - (iv) Test equipment requirements description.
 - (v) Certified payload operations descriptions.
 - (vi) Operational capabilities.
 - (vii) Environmental requirements and consideration.
 - (viii) QA test requirements i.e. ATP etc.

Verification Plan:

- (1) Certification Approach. Give a brief explanation of the approach to be used for certification. This shall include, but is not limited to: The Certification Rationale, describing the certification methods (e.g. assessment, review of design, inspection, analysis, test, similarity). The Certification Plan Justification, describing the sequence of test activity, use of the Verification Matrix and System Implementation rationale, see Detailed Requirements section 2 below, the use of test procedures, the documenting of test failures and non-compliance's, etc.
- (2) Acceptance Approach. Give a brief explanation of the approach to be used for acceptance. This shall include, but is not limited to: The requirement for acceptance testing of parts, components, assemblies, receiving tests, etc. The requirement for Pre-Delivery Acceptance (PDA) testing. The requirement for Pre-Installation Acceptance (PIA) testing. The requirement for Environmental Testing Acceptance Test Procedures (ATP), Acceptance Review (AR) for Delivered Item, .
- (3) Requirements Verification Matrix, in table format.
 This matrix shall list, but is not limited to, the following information:
 - (i) Name and part number of the hardware
 - (ii) The requirements
 - (iii) Exceptions, if any, to the requirements
 - (iv) The verification method (e.g. assessment, review of design, inspection, analysis, test, or similarity)
 - (v) A comment block for special comments or explanations

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 33
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Certification Data Package (CDP)
7. **DESCRIPTION/USE:** To provide objective evidence to NASA that the delivered item meets requirements. The certification data package, when approved, is the NASA certification.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Incremental certification with initial submission of design phase verifications at Critical Design Review.
10. **SUBMISSION FREQUENCY:** Updates at subsequent milestone reviews and as required. Final submission at Acceptance Review.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, SSP 30695, SPAR-RMS-SG.139, SPAR-R.776, SPAR-SG.392, SPAR-RMS-PP.031, MDA PE-PR.047; PE-WI.027 & PE-WI.029
- 13.3 **CONTENTS:**
 - (a) Reference Documents:

EA-WI-023 "Project Management of GFE Flight Projects"

DRD # 19 Limited Life Item List

DRD # 24 Materials and Processes Summary Report and Material Usage Agreement

DRD # 26 Waiver/Deviation Approval requests

DRD # 27 SRMS Board Certification Approval Request (SRMSCAR) and Government Certification Approval Request (GCAR)

DRD # 14 Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL)

DRD # 16 Shuttle Safety Analysis Report (SAR) and Hazard Report (HR) and Station Hazard Reports (SHR)

DRD # 36 Non-Conformance Reports (NCRs)
 - (b) Scope:

The Certification Data Package contains all data needed to determine that the item meets requirements.
 - (c) Format and Contents:
 - (1) Hard and soft-copy SRMSCAR (JSC form 1296 DRD # 27)
 - (See <http://www.srqa.jsc.nasa.gov/gcars/> for additional information and instructions)
 - (2) Verification and Validation plan with Annotated Verification Matrix
 - (3) Risk Assessment Executive Summary Report (RAESR) (DRD # 35) (FMEA and hazard analysis)
 - (4) Materials Certification and Processes Summary Report (DRD # 24), and as needed the Fracture Control Report and Materials Usage Agreement

DRD CONTINUATION SHEET

TITLE: Certification Data Package (CDP)

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DATA TYPE: 2

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- (5) Engineering Analysis Reports (Stress analysis, thermal analysis, EEE Parts Stress Analysis/De-rating Analysis, structural analysis, toxicological memo, etc.)
- (6) Acceptance Test Reports (for qualification unit)
- (7) Qualification Test Reports
- (8) Waivers, deviations (DRD # 26) and NCR's (DRD # 36)
- (9) Problem Closure Reports (FIARs) (for qualification unit)
- (10) Limited Life Items List (DRD # 19)
- (11) Engineering Drawings
- (12) Project Technical Requirements Specification
- (13) Approved Change Request to the Project Technical Requirements Specification
- (14) Structural Integrity Verification Plan (if separate from verification and validation plan)
- (15) Certification Compliance Matrix, 8080.1 Compliance matrix, and 50021 Compliance matrix

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1
2. **DRD NO.:** 34
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/3
6. **TITLE:** Electrical, Electronic, and Electromechanical (EEE) Parts Control
7. **DESCRIPTION/USE:** To define and document the contractor's requirements, system and implementation processes and procedures for controlling the selections, acquisitions, traceability, testing, handling, packaging, storage and application of Electrical, Electronic, and Electromechanical (EEE) Parts for flight and critical ground support equipment.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP and as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** All DRDs
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, C.1.3.3, NSTS 5300.4 (1D-2), SSP 30312, SSP 30423, MDA-RMS-PA.2533, PE-PR.047
- 13.3 **CONTENTS:**
 - (a) The contractor shall implement NASA's policy, for controlling risk and enhance reliability by controlling the EEE Parts used in flight and critical ground support equipment. To carry out this policy, the contractor shall accomplish the following:
 - (1) Select parts and packaging technology based on their intended use considering, but not limited to, performance, environmental, criticality, and lifetime requirements. To the greatest extent possible, part selection shall be made from previously qualified parts.
 - (2) Enhance equipment and system reliability by utilizing documented de-rating criteria of the parts parameters in the design applications.
 - (3) Utilize the results of surveys/audits as a means to determine capability and qualification of suppliers/sources. When using third party survey result, the survey process used by third-party auditors/surveyors (including those performed by other Government agencies or commercial third-party auditors) and the survey results must be reviewed prior to their use to determine that the process and results meets minimum NASA requirements.

The contractor shall document Parts Control through company processes and procedures with the features discussed below as a minimum. The processes and procedures shall demonstrate that the contractor has the technical expertise, documentation system and defined management roles and responsibilities that will assure adequate implementation of the processes and procedures.

DRD CONTINUATION SHEET

TITLE: Electrical, Electronic, and Electromechanical (EEE) Parts Control
DATA TYPE: 1

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(b) **Parts Selection:** The Parts Control processes and procedures shall describe a concurrent engineering process, integrated with hardware design, in which parts are selected for use in hardware on the basis of suitability for the intended application. The processes and procedures shall identify parts that are considered standard and how other (non-standard) parts will be evaluated and controlled. As a cost-controlled initiative and without overly limiting the designer's ability to select emerging technologies, the processes and procedures will address how the system will limit the number of different part types and the number of non-standard parts used in hardware design

(c) **Controlling specifications:** Parts shall be controlled by specifications which delineate as a minimum:

- (1) Complete identification of the part
- (2) Physical, environmental, and performance specifications
- (3) Reliability requirements, including inspections and tests for qualification, acceptance, and lot sampling
- (4) Special handling, packaging, and storage requirements.
- (5) Documentation, data retention, and submittal requirements.

(d) **Part Qualification:**

(1) Parts shall be qualified to the requirements of the controlling specification. Part qualification must demonstrate that the part meets its ratings, that it is suitable for the application, and that the manufacturer is using materials, process, design, and quality controls that will produce a consistent, reliable, high quality device.

(2) Where adequate qualification data are not available, the processes and procedures shall describe the process of qualification testing to demonstrate that the part meets its ratings and that it is suitable for the application.

(3) Parts shall be re-qualified in the event of manufacturer process changes, or when a new lot of qualified parts is procured and it cannot be documented that the parts manufacturer has not changed the materials, processes, equipment, or facility used to manufacture the part.

(4) The processes and procedures shall address how the contractor will document and maintain the documentation to support the "qualified status" of parts and the respective suppliers.

(5) **Design Configuration Acceptability and Control:** The processes and procedures must address how the selected parts for a design are reviewed for suitability for the application and environment, how the parts quality and reliability will meet the operational performance requirements, and if the parts are being used within the specific device ratings (including the appropriate de-rating procedures). The selection process, technical acceptability of devices, and application documentation and review results shall be available to NASA to support hardware design reviews, certification, acceptance reviews, problem resolutions, and ground and flight operations. Key elements are as-designed-parts lists, application stress analyses (including radiation effects), and non-standard parts acceptability assessments.

(6) **Parts Procurement:** The processes and procedures must address how the contractor will select, qualify, control, and monitor parts manufacturers. The procurement must address the contractor's source inspections, receiving inspection (including destructive physical analysis), and stocking and handling procedures prior to and during assembly. These procedures must address how the contractor will avoid the procurement and any subsequent installation of parts or "lots" of parts subject to conditions identified in GIDEP and NASA ALERT's. This section of the processes and procedures must ensure that the selection and use of the parts will not have an "obsolescence" issue.

(7) **Radiation Effects:** The Parts Control processes and procedures must include the following requirements, as applicable:

(e) It must be shown by analysis or test that Single Event Upset (SEU) or total dose radiation effects will not cause Electrical, Electronic, or Electromechanical (EEE) parts to fail or malfunction in such a manner

DRD CONTINUATION SHEET

TITLE: Electrical, Electronic, and Electromechanical (EEE) Parts Control
DATA TYPE: 1

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as to cause a safety hazard or loss of mission.

(f) EEE parts that are used to control a hazard, or as part of a subsystem that controls a hazard must be immune to the SEU and total dose radiation environment to which they will be exposed. This requirement can be waived in the event that a radiation hard, or purely mechanical (for example, a fuse, circuit breaker, mechanical thermostat, or pressure relief valve) device is used as a backup hazard control.

(1) Off-The-Shelf (OTS) EEE Parts and Assemblies: The processes and procedures shall address the approval and use of OTS EEE Parts and Assemblies.

(2) Documentation: The processes and procedures must define the contractor's electronic (preferred) or paper documentation system, data supporting milestone and design reviews, and NASA's access to the parts electronic database and files.

13.4 **FORMAT:** Electronic format submittal is preferred. The processes and procedures are to be an official controlled document.

13.5 **MAINTENANCE:** As required to remain current.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 35
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Non-Conformances (NC) Record
7. **DESCRIPTION/USE:** To provide that all nonconformance are documented in consistent manner and to assure that all the necessary data is included and available.
8. **DISTRIBUTION:** MV/COTR
9. **INITIAL SUBMISSION:** Within 48 hrs of occurrence of all Class 1 non-conformances.
10. **SUBMISSION FREQUENCY:** As required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** DRD 22
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** All data and documentation in support of the Program.
- 13.2 **APPLICABLE DOCUMENTS:** C.1.1.3.3.1, MDA PE-PR.047 & PE-PR.018
- 13.3 **CONTENTS:**
 - (a) Scope:

This DRD establishes the minimum data elements necessary to provide records of the closed loop system for the control of non-conforming products. Non-conformances shall commence with the initial receipt of material or articles for the procurement and continue through all subsequent phases of the program. A nonconformance is defined as when an item fails to meet a specified requirement.
 - (b) Contents: The record shall contain the following data elements:
 - (1) A unique and traceable number;
 - (2) Identification of the non-conforming article or material;
 - (3) Nomenclature
 - (4) Part identification number
 - (5) Serial no./Lot no./Version
 - (6) Manufacturer's name of the Manufacturer's Contractor and Government Entity (CAGE) code (preferable)
 - (7) The date the nonconformance was discovered;
 - (8) The name of the initiator of the nonconformance record;
 - (9) A description of the nonconformance including a description of the required characteristics or specification;
 - (10) The type of activity being conducted (e.g. fabrication, assembly, qualification test, system test, pre-delivery or pre-installation test, etc.). Reference must be made to applicable procedure numbers;
 - (11) When appropriate, identification of the next higher assembly;
 - (12) Nomenclature

DRD CONTINUATION SHEET

TITLE: Non-Conformance (NC) Record
DATA TYPE: 1

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- (13) Part identification number
- (14) Manufacturer's name of the Manufacturer's CAGE code (preferable)
- (15) Disposition of the non-conforming article or material;
- (16) The signatures of the personnel authorized to provide disposition;
- (17) Verification that the prescribed disposition was acceptably completed; and
- (18) When applicable, cross-references to an associated PRACA report.

13.4 **FORMAT:** In the contractor's format.

13.5 **MAINTENANCE:** Update as required. These records shall be available upon request.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 6. **ISSUE:** BASIC
2. **DRD NO.:** 36
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/2
6. **TITLE:** Property Management Plan (PMP)
7. **DESCRIPTION/USE:** To describe the method of administering Government property.
8. **DISTRIBUTION:** BV/Contracting Officer, MV/COTR, JA/Industrial Property Officer
LF/Finance
9. **INITIAL SUBMISSION:** Preliminary one month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Final three months after ATP
11. **REMARKS:**
12. **INTERRELATIONSHIP:** Paragraph (e)(2) of FAR Clause 52.245-1, SOW C.1.1.3.1.1
13. **DATA PREPARATION INFORMATION:**
 - 13.1 **SCOPE:** The Government Property Management Plan defines the contractor's implementation of the life cycle function categories of Government personal property. It also defines the process for property disposition for Transition/Retirement.
 - 13.2 **APPLICABLE DOCUMENTS:** Federal Acquisition Regulation (FAR) Part 45, NASA FAR Supplement (NFS) Part 1845
 - 13.3 **CONTENTS:** This plan shall identify those procedures which constitute the contractor's Property Management System and shall include at a minimum the following categories:

a) Property management	i) Reports
b) Acquisition	j) Consumption
c) Receiving	k) Utilization
d) Identification	l) Maintenance
e) Records	m) Subcontractor control
f) Movement	n) Disposition
g) Storage	o) Contractor close-out
h) Physical Inventories	

Within the contract, the loan or transfer of property between NASA centers or remote sites shall be processed in accordance with procedures identified in the PMP insuring management and engineering reviews and approvals are obtained prior to movement, as appropriate. The contractor shall insure appropriate property, tracking, and status records are adjusted accordingly as such transfers and movements are authorized.

DRD CONTINUATION SHEET

TITLE: Property Management Plan (PMP)
DATA TYPE: 2

DRD NO.: 36
PAGE: 2/2

The contractor shall identify excess or obsolete assets and initiate excessing action. Receipt and disposal of excess property at NASA centers is a government provided service identified. Property excessing performance shall be reported. The following documents are provided as reference when dealing with NASA Centers:

Directive ID	Subject
<u>NPD 4100.1A</u>	Supply Support and Material Management Policy (Revalidated 10/29/03)
<u>NPR 4100.1D</u>	NASA Materials Inventory Management Manual (Revalidated 3/30/04)
<u>NPD 4200.1A</u>	Equipment Management
<u>NPR 4200.1E</u>	NASA Equipment Management Manual
<u>NPR 4200.2B</u>	Equipment Management Manual for Property Custodians w/Change 1, 9/11/03
<u>NPD 4300.1A</u>	NASA Personal Property Disposal Policy (Revalidated 12/8/04 of 1 year)
<u>NPR 4300.1A</u>	NASA Personal Property Disposal Procedural Requirements
<u>NPD 4300.4D</u>	Use of Space Shuttle and Aerospace Vehicle Materials as Mementos (Revalidated 3/29/04)
<u>NPR 4310.1</u>	Identification and Disposition of NASA Artifacts (Revalidated 12/8/04)

13.4 **FORMAT:** Contractor format is acceptable.

13.5 **MAINTENANCE:** Changes shall be incorporated as required by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 3. **ISSUE:** BASIC
2. **DRD NO.:** 37
3. **DATA TYPE:** 4
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Task Orders Authorized
7. **DESCRIPTION/USE:** The purpose of the report is to provide data to assist in the administration of the IDIQ section of the contract.
8. **DISTRIBUTION:** MV/COTR, BV/Contracting Officer
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** Quarterly, by the 17th of the month
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** I.2, I.3, and I.4
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** This report provides task order data.
- 13.2 **APPLICABLE DOCUMENTS:** None.
- 13.3 **CONTENTS:** The Task Order Authorized report will include the following data:

(a) Task order number	(h) Fee Negotiated
(b) Change Request number	(i) Value
(c) Date authorized	(j) Closed out (Y/N)
(d) Current status	(k) Closed out date
(e) Task order title	(l) Actuals
(f) Contract type	(m) Totals for task order table
(g) Cost	
- 13.4 **FORMAT:** Electronic, in the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

- | | | | | |
|----|---------------------|---------------------|----|----------------------|
| 1. | DRL NO.: 4. | ISSUE: BASIC | 2. | DRD NO.: 38 |
| 3. | DATA TYPE: 4 | | 4. | DATE REVISED: |
| | | | 5. | PAGE: 1/1 |
6. **TITLE:** Headcount Report
7. **DESCRIPTION/USE:** To provide on-site and off-site headcount data which is used to provide NASA required workforce reports and for future planning for requirements.
8. **DISTRIBUTION:** BV/Contracting Officer, MV/COTR,
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** Quarterly, by the 17th of the month
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** SOW C.1.4.3
13. **DATA PREPARATION INFORMATION:** None.
- 13.1 **SCOPE:** This report provides headcount and critical skills data.
- 13.2 **APPLICABLE DOCUMENTS:** None.
- 13.3 **CONTENTS:** The contractor shall provide a report detailing its headcount and critical skills.
- 13.4 **FORMAT:** Electronic, in the contractor's format.
- 13.5 **MAINTENANCE:** Changes shall be incorporated by change page or complete reissue.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 39
3. **DATA TYPE:** 1
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** End of Program Plan
7. **DESCRIPTION/USE:** Establish a comprehensive strategic and tactical retention plan phased by fiscal year that outlines the initiatives implemented to retain critical skills within the prime and critical subcontractors until the end of the Space Shuttle Program, maintain hardware, and safely complete the program objectives.
8. **DISTRIBUTION:** BV/Contracting Officer, MV/COTR
9. **INITIAL SUBMISSION:** March 3, 2008
10. **SUBMISSION FREQUENCY:** Annually.
11. **REMARKS:**
12. **INTERRELATIONSHIP:** SOW C.1.4
13. **DATA PREPARATION INFORMATION:**
 - 13.1 **SCOPE:** The End of Program Plan shall include all contributory elements to ensure human capital and hardware resources are maintained to safely and successfully execute the manifest through the end of the Space Shuttle Program.
 - 13.2 **APPLICABLE DOCUMENTS:**
 - 13.3 **CONTENTS:** The plan shall include the following content:
 - (1) Human Capital
 - a) Definition and identification of each critical skill and the standard to support the designation of "critical" in each Program Element functional area that must be maintained, along with identification of acceptable date for loss of each particular critical skill.
 - b) Identify and distinguish essential workforce from critical skills, and identify the essential workforce that must be maintained in each Program Element functional area, along with identification of acceptable date for loss of "segregable" portions of essential workforce in a functional area.
 - c) Reference to retention policies adopted and other policies and actions being pursued specifically for the retention of critical skills and essential workforce for this contract, as laid out in the plan. In support of policies implemented by the contractor, provide linkage to benchmarking of human capital retention issues across the aerospace industry, focusing on retention policies successfully adopted in industry to combat loss of critical skills in an "end of program life" posture.
 - d) Demonstrate linkage between the critical skills and essential workforce identified under this plan and the retention policies the contractor has or proposes to adopt to combat loss of critical skills and essential personnel under this contract. Include the rationale for how the need for any workforce retention features was determined.

DRD CONTINUATION SHEET

TITLE: End of Program Plan

DRD NO.: 39

DATA TYPE: 1

PAGE: 2/2

Detail the metrics for judging performance against the plan, and the strategy for adjusting the plan and any linked retention policies. Minimum metrics at the element and total levels should include: attrition of

(2) Property

- a) Identification and definition of property including hardware, facilities, material and data.
- b) Definition and identification of property classifications, designations and standards to support disposition of property including mission or capability supported, special maintenance, storage or handling requirements and acceptable date of release.
- c) Disposition strategy and process for the decommissioning and disposal or transfer of property to follow-on programs while supporting a safe and efficient completion of the program.
- d) The plan shall define a phased approach to property disposition to streamline the large volume of property disposition activities expected at the completion of the program. This shall include requirements the routine disposition and disposal of property.
- e) Requirements for routine reporting of property for the purpose of judging performance against the plan. This shall include total items, items dispositioned, items disposed of.

13.4 **FORMAT:** Contractor format is acceptable.

13.5 **MAINTENANCE:** The product shall be actively managed and updated annually by the contractor and submitted electronically to NASA.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 40
3. **DATA TYPE:** 4
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** Financial Reporting Contractor-Held Property
7. **DESCRIPTION/USE:** Report NASA Property in the custody of contractors on both a monthly and annual basis.
8. **DISTRIBUTION:**
 - a. The monthly reports shall be electronically submitted using the format described in the CHATS user's manual.
 - b. NASA Form (NF) 1018 reports shall be submitted electronically using the format described in the NF 1018 Electronic Submission System (NESS) (<http://ness.gsfc.nasa.gov/>).
9. **INITIAL SUBMISSION:** Consistent with ongoing submission of schedule from NNJ08GA03C.
10. **SUBMISSION FREQUENCY:** The due date for the Monthly Property Financial Reporting submission is the 21st day after the close of the month, beginning at the first month after contract start. The first monthly submission will be for the month of February 2008. Example due dates for the monthly submission are as follows: August 21 for the month ending July 3; September 21 for the month ending August 31; and October 21 for the month ending September 30. The due date for Annual Property Reporting via NASA Form (NF) 1018 is November 30. All reports shall be submitted electronically.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** NASA FAR Supplement Subpart 1845, NASA FAR Supplement 1845.7101, NNJ08GA03C Article G.6, SOW C.1.1.3.1.1 and in accordance with approved Property Control Procedures.
13. **DATA PREPARATION INFORMATION:**
 - a. Monthly Property Financial Reports are required to be submitted using the format located at the URL referenced in paragraph below. Monthly Financial Report will be submitted in accordance with PIC 04-12.
 - b. Annual Property NF 1018 reports shall be submitted using the NF 1018 Electronic Submission System (NESS). The NF1018 report provides annual summary-level property management and financial data on Government-furnished and contractor-acquired NASA property.
 - c. The NF1018 shall be completed in accordance with NASA FAR Supplement Subpart 1845.7101 and any supplemental guidance provided by the Contracting Officer.
- 13.1 **SCOPE:** In compliance with NFS 1845.
- 13.2 **APPLICABLE DOCUMENTS:** None.
- 13.3 **CONTENTS:**
 - (a) Monthly Property Financial Reports
 - (1) Monthly property financial reports are required with item level supporting data. This data shall be submitted for all items with an acquisition cost of \$100,000 or more, in the contractor's and its subcontractors' possession, in the following classifications: real property, equipment, special test equipment, special tooling, and agency peculiar property. Monthly reporting is not required for property in

DRD CONTINUATION SHEET**TITLE:** Financial Reporting Contractor-Held Property**DRD NO.:** 40**DATA TYPE:** 4**PAGE:** 2/2

the above classifications with an acquisition cost under \$100,000. Monthly data shall also be submitted for items of any acquisition cost in the classifications of materials and contract work-in-process (WIP). Itemized monthly data is required for materials and WIP line items of \$100,000 and over. Summary monthly data is required for materials and WIP line items under \$100,000. The monthly reports shall be electronically submitted using the Contractor-Held Asset Tracking System (CHATS) (<http://nasachats.gsfc.nasa.gov/>) using the format described in the CHATS user's manual.

(2) Acquisition costs shall be developed using actual costs to the greatest extent possible, especially costs directly related to fabrication such as labor and materials. Supporting documentation shall be maintained and available for all amounts reported, including any amounts developed using estimating techniques.

(3) All Adjustments shall be thoroughly explained and directly related to a specific fiscal year. If the fiscal year cannot be determined, the default shall be the previous fiscal year.

(4) Work Breakdown Structures (WBS) shall NOT be provided for all Contractor acquired property (CAP), WIP, and any new materials acquired

(b) NF 1018 Reports

(1) Contractors shall report all NASA-owned property in US dollars, regardless of location.

(2) Negative reports are required.

(3) This reporting shall be completed in accordance with the NASA FAR Supplement (NFS) Subpart 1845.7101 and any supplemental guidance provided by the Contracting Officer.

13.4 **FORMAT:** See "Distribution".

13.5 **MAINTENANCE:** Corrections/updates are to be reported to the cognizant Industrial Property Officer (IPO) and submitted through NESS when directed by the IPO.

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DRL NO.:** 1 **ISSUE:** BASIC
2. **DRD NO.:** 41
3. **DATA TYPE:** 2
4. **DATE REVISED:**
5. **PAGE:** 1/1
6. **TITLE:** IT Security Plan For SRMS Servers
7. **DESCRIPTION/USE:** Prepare, maintain, and provide critical updates to the NASA JSC OCSO for MV5 servers. Identify and document appropriate IT security controls consistent with the sensitivity of information and NASA requirements to maintain server certification.
8. **DISTRIBUTION:**
MV/Contracting Officer's Technical Representative (COTR)
9. **INITIAL SUBMISSION:** One month after Authority to Proceed (ATP).
10. **SUBMISSION FREQUENCY:** Annually or as required.
11. **REMARKS:** None.
12. **INTERRELATIONSHIP:** SOW reference C.1.1.3.1.5.1 "IT Security Plan", DRDs 2-6
13. **DATA PREPARATION INFORMATION:** NASA JSC CSCO Security Request.
- 13.1 **SCOPE:** Achieve & Maintain System certification status for all MV5 managed network servers at JSC.
- 13.2 **APPLICABLE DOCUMENTS:** JPG 2810.1, JA 01-060, JPD2800.4 , JPR 2810.1 , JSC-05900, JSC-26648, NPR 2810.1, SO-999-L-JSC-0073 (SPMA0006), NIST SP 800-60 vol. II and PL 100-235.
- 13.3 **CONTENTS:**
The IT system security plan shall be prepared consistent, in form and content, with approved JSC template. The security plan shall identify and document appropriate IT security controls consistent with the sensitivity of the information and NASA IT security requirements.
The prepared data shall cover the following areas and contents:
 - (1) Executive Summary
 - (2) Operational Risks
 - (3) Statement of Readiness for Certification and Accreditation
 - (4) Plan Development
 - (5) Management Controls
 - (6) Operational Controls
 - (7) Technical Controls
- 13.4 **FORMAT:** Electronic, in the contractor's format.
- 13.5 **MAINTENANCE:** Whenever changes are required with the MV system, all the required changes shall be incorporated into the IT Security Plan, Risk Assessment, POA&M and submit a plan of mitigation on an as needed basis.

Attachment J-5
Government Property (GP)

(a) The contract includes Government Property (GP) that will be provided at various sites under this contract. The GFP list includes all items of property accountable under the NAS9-03045 contract as of the effective date of this contract. For the purpose of this contract, an electronic listing of each line item and the associated dollar value of GP that will be transferred from the NAS9-03045 contract, grouped by classification, will be provided to the contractor. Once MDA completes the 100% inventory for the NAS9-03045 contract, this GP listing will be transferred from NAS9-03045 contract to the follow-on contract NNJ08GA03C. Changes to the GP list will be implemented through DRD 40, "Financial Reporting Contractor-Held Property".

An electronic GP listing is available upon request through the Contracting Officer.

(End of Attachment)

Attachment J-6

Advance Agreement on Severance Payments

I. Background

This agreement is between NASA and the CCC regarding the payment of severance costs by its subcontractor MDA to MDA employees.

The announced phase down and completion of the operations phase of the NASA Space Shuttle program significantly impacts MacDonald Dettwiler & Associates (MDA) ability to attract and retain employees required to support contractual obligations under the Shuttle Remote Manipulator System (SRMS)/Inspection Boom Assembly (IBA)/Robotic Work Station (RWS) contract with NASA. This Advance Agreement for severance payments was developed utilizing the Canadian Employment Standards Act (ESA) of 2000 and comparable severance payments agreements that NASA has established with United States major aerospace companies, such as the United Space Alliance under the Space Program Operations Contract NNJ06VA01C. This Advance Agreement is applicable to MDA employees supporting the Space Shuttle Program under the NNJ08GA03C contract.

II. Purpose

In accordance with Federal Acquisition Regulation (FAR) Part 31.109 "Advance Agreements", this document sets forth an Advance Agreement between the National Aeronautics and Space Administration (NASA) and CCC, to address the treatment of severance payment costs for the purposes of establishing future allowability, allocability, and reasonableness of such costs as may be incurred under the contract. Nothing in this agreement is intended or shall be construed to relieve CCC or its subcontractor, MDA from compliance with the contract terms and conditions and applicable law and regulation.

III. Terms and Conditions

A. Allowability, Allocability, and Reasonableness. NASA agrees that all costs (direct and indirect) for severance payments paid in accordance with the MDA policy in effect at the time of this agreement, to employees whose work is allocable to contract NNJ08GA03C, will be deemed allowable, allocable, and reasonable for amounts up to one week of pay for each year of employment, up to a maximum of 26 weeks. Severance payments offered to MDA employees in excess of this amount are not reimbursable under this contract.

Costs will be billed to NASA as they are incurred. Cost will only be recognized and reported under the NNJ08GA03C contract after severance payments have been paid by MDA (i.e. all requirements satisfied) to MDA employees.

Conditions:

1. A change to FAR Part 31 effective after the date of this agreement, that is bilaterally incorporated into this contract and impacts the reasonableness and/or allowability of the costs addressed in this agreement, may necessitate modification of this agreement to comply with the change.

2. Payments made in kind (non cash) to the costs addressed in this agreement made by MDA to employees shall be subject to a separate determination of allowability, allocability and reasonableness, and those costs are not considered a part of this agreement.

3. Pursuant to FAR Part 31.205-6(g): "Payments made in the event of employment with a replacement contractor where continuity of employment with credit for prior length of service is preserved under substantially equal conditions of employment, or continued employment by the contractor at another facility, subsidiary, affiliate, or parent company of the contractor are not severance pay and are unallowable."

4. Nothing in this agreement shall be construed to alleviate any requirements for review of costs associated with this agreement and for determination of their compliance with the agreement.

B. Contract Value Adjustments. Severance payments are not included in the NNJ08GA03C baseline contract value. The parties agree that no subcontractor (MDA) fee is allowed on severance payments.

C. Notification and Review Requirements. Any information that would impact the severance costs covered by this agreement shall be provided to the Contracting Officer for concurrence in advance of implementation in order for the effect of that change to be agreed to by NASA for coverage by this agreement. The allowability of severance costs is based on MDA's written policy/plan in effect at the time of this agreement. Any change to MDA's policy will necessitate a review by the Contracting Officer to determine and approve the continued allowability of severance costs under this agreement.

IV. Applicability and Period Covered by this Agreement

This agreement will apply to all severance costs incurred consistent with the provisions of this Advance Agreement during the period from January 1, 2008, until 120 days after completion of the last Shuttle flight.

V. Disputes

This agreement is subject to the H.13 Disputes clause of the contract.

Attachment J-7

Safety & Health Plan

The MDA Health & Safety Department Manual, document number MDA-STD-M.9494 (Rev A), dated March 2008 is hereby incorporated into the contract by reference.



MDA-STD-M.9494

Revision: A

Date: March, 2008

Health & Safety Department Manual

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MDA-STD-M.9494

Revision: A

Date: March, 2008

Revision and History Page

Revision	Amendment	Date
A	Initial issue	March, 2008

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MDA-STD-M.9494

Revision: A

Date: March, 2008

Prepared By:

Catherine Galvao

Health and Safety Manager

March, 2008

Date

Approved By

Catherine Galvao

Health and Safety Manager

March, 2008

Date

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1 Introduction

MDA is committed to taking all reasonable precautions to ensure the protection of workplace health and safety and the natural environment in the conduct of its business.

Each employee is required to receive adequate training in their specific tasks, protect their own health and that of their co-worker, work in a safe manner, ensure fire regulations and prevention are followed, comply with applicable government legislation and adhere to the company's safe work practices and procedures.

Managers, as well as all employees, will be held accountable for the health and safety of their fellow workers, as well as a safe, healthy work environment, ensuring that the facilities, machinery and equipment are safe and that employees follow established work practices and legislation in providing materials, products, services and protection of the environment.

Each employee shall promptly report concerns or violations to their manager or supervisor and participate in any resolutions, if necessary.

Health and safety must form an essential part of the organization by clear leadership from management and a strong commitment by all employees.

MDA is committed to the promotion of the health, safety and wellbeing of all members, to the provision of a safe and healthy work environment, and to the prevention of occupational injuries and illnesses.

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1.1 Accommodating Injured Employees and Return to Work

1.1.1 Intended Use Or Application

To detail procedures in accommodating injured employees back into the workforce quickly, safely and successfully, thereby, controlling accident costs.

When an employee is injured and not able to perform his/her regular duties. This program is designed to return injured employees to work as quickly as possible, either to their pre-accident job with modifications, if necessary, or some other type of gainful employment.

1.1.2 Other

The essential ingredient of any return to work program is through contact and cooperation between the employee and the employer, with the involvement of the treating physician, as soon as possible after an injury and during the worker's recovery period.

1.1.2.1 Instructions

Workplace Safety & Insurance Act: Bill 99:

- s.40 (1)(a), 40(2)(a)- Employer and worker have an obligation to communicate.
- s.37 (3) - Family physician must provide employer and/or worker information concerning functional abilities.

Accommodating an employee may include:

- 1) working fewer hours
- 2) taking more frequent breaks
- 3) obtaining assistance from a co-worker for more difficult tasks
- 4) physical changes to work environment
- 5) assistive devices
- 6) assignment to another job
- 7) re-adapting to the physical demands of the work

Each manager and employee is encouraged to utilize whatever measures are most appropriate in each individual case.

A labour market re-entry assessment shall be conducted by the Workplace Safety and Insurance Board (WSIB) if any of the following circumstances exist:

- 8) If it is unlikely the worker will be re-employed by his or her employer.
- 9) If the worker's employer has been unable to arrange work for the worker.
- 10) If the employer is not co-operating in the early and safe return to work.

Based on this assessment the WSIB shall decide if a labour market re-entry plan is necessary.

Labour Market re-entry plan is intended to replace the vocational rehabilitation provisions in the current legislation.

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1.1.2.2 The Injured Employee Is Required To

- 1) Contact your Manager and/or Health & Safety Manager, as soon as possible after an injury and maintain contact throughout the recovery period.
- 2) Take a functional evaluation form, Schedule "A", with you to your treating physician in case you are not able to return to your regular duties. Give the completed form to the H&S Manager as soon as possible. If you are not able to get this form completed immediately, you can still return to work with verbal confirmation of your restrictions, from the treating physician.
- 3) Meet with your manager and the H&S Manager as soon as possible following the injury and doctor's visit. At this time, document duties to be performed and hours of work.
- 4) Complete any required forms, such as WSIB form # 6. (Worker form)
- 5) Report to your manager or H&S Manager, any difficulties or concerns regarding the modified duties provided.
- 6) Maintain regular contact with the manager and H&S Manager, at least once or twice a week, and immediately advise of any changes in your medical condition.

1.1.2.3 Managers Are Required To

- 1) Have a system in place to accommodate the injured employee.
- 2) Investigate the injury or complaint and notify the H&S Manager as soon as possible.
- 3) Complete a Manager/Supervisor Investigation form and send a copy to the H&S Manager.
- 4) Meet with the employee and the H&S Manager if the employee has been given restrictions by his physician, and arrange, in writing, suitable work, duties and hours of work.
- 5) Monitor modified duties to see if adjustments are necessary, while the employee is on modified duties.
- 6) Notify the H&S Manager if the employee does not report to work as scheduled.
- 7) Follow up with the employee to ensure modified work is suitable.

1.1.2.4 Health & Safety Manager Is Required

- 1) Develop a modified work program in conjunction with the manager, employee, physician and WSIB, if necessary.
- 2) Maintain regular contact with the injured employee, at least once per week, and inform the manager of the status of the claim and any changes in medical condition.
- 3) Keep written notes of communication with the employee or WSIB on Schedule "B".
- 4) Follow up with the employee to ensure modified work is suitable and until the restrictions are removed.
- 5) Follow up with the employee in obtaining updates from the physician until restrictions are removed or declared permanent.
- 6) Follow up with the manager on employee's condition and progress until restrictions are removed.



1.1.3 Schedule "A" – 6.25 – Functional Ability, Return to Work

Employee's Name:				
MDA supports early intervention for return to work, and will accommodate by temporary job modifications a program that is reasonable and appropriate for an injured worker. This completed form will help decide on what is best suited for the employees restrictions in our modified work program.				
Date of examination for this injury	Day	Month	Year	Area of body injured
Is treatment required?	Yes <input type="checkbox"/>	No <input type="checkbox"/>		Explain
Physical Precautions (Functional activities that should be avoided) Place "T" for Temporary and "P" for Permanent, in the boxes applicable.				
Shoulder <input type="checkbox"/> Right <input type="checkbox"/> Left <input type="checkbox"/> Repetitive shoulder movement <input type="checkbox"/> Heavy Lifting <input type="checkbox"/> Above shoulder activity <input type="checkbox"/> Repetitive use of upper extremity against resistance (e.g. pulling & pushing against a force) Other <input type="checkbox"/> Restrictions in operating motorized equipment _____ <input type="checkbox"/> Restrictions in using tools/machinery _____ <input type="checkbox"/> Restrictions related to environment (e.g. exposure to cold, wet, chemicals) _____ <input type="checkbox"/> Needs protective/ equipment (e.g. gloves, masks, respirators) _____ <input type="checkbox"/> Precautions related to medication (e.g. use of motorized equipment) _____ <input type="checkbox"/> Other Injuries Not Mentioned above _____		Neck <input type="checkbox"/> Repetitive neck movement <input type="checkbox"/> Above shoulder & Overhead activity <input type="checkbox"/> Prolonged static posture Upper Extremity (Including Elbow, Wrist & Hand) <input type="checkbox"/> Right <input type="checkbox"/> Left <input type="checkbox"/> Repetitive movement of the injured joint against resistance and repetitive gripping Lower Extremity (including hip, knee, ankle & foot) <input type="checkbox"/> Right <input type="checkbox"/> Left <input type="checkbox"/> Repetitive movement of the injured joint against resistance <input type="checkbox"/> Prolonged weight bearing <input type="checkbox"/> Rough ground walking <input type="checkbox"/> Low-level activity & climbing <input type="checkbox"/> Kneeling Back <input type="checkbox"/> Repetitive trunk movement <input type="checkbox"/> Heavy lifting <input type="checkbox"/> Prolonged weigh bearing (includes sitting, standing & walking)		
Can the worker return to a regular work schedule with above precautions being observed? <input type="checkbox"/> Yes <input type="checkbox"/> No				

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Health Professional Name:	Date:
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**1.1.4 Communication Form - Schedule "B" – 6.25 Workplace Safety & Insurance Board
and/or Employee**

Date:	Time:
Talked to:	Telephone No:
Employees Name:	Claim #:
Details of Conservation:	

Progress Report:

Signature:	Date:
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1.2 Contractor/Subcontractor Safety, Workplace Construction

1.2.1 Intended Use Or Application

To ensure that any work activities are conducted in a fashion that adheres to and complies with current applicable legislation and regulations, including the Occupational Health & Safety Act and shall comply with all MDA's safety requirements, including the use of Personal Protective Equipment.

To ensure permits are obtained, if required, to do the task or operations before the beginning of the job.

To ensure that any contractor/subcontractor/vendor/supplier/consultant performing work for MDA will provide us with a (WSIB) Workers' Safety & Insurance Board Certificate of Clearance and proof of liability insurance coverage, minimum of at least \$1,000,000, as well as documentation, if applicable, of their personnel being trained in hazards or any other applicable legislation. Persons who work independently are exempt from a clearance certificate but require an Independent Operator's form completed and approved by WSIB.

When contracting contractors/subcontractors/vendor/supplier/consultants with instruction to work in a safe and reasonable manner when working at facilities owned or operated by MDA.

1.2.2 Work Steps

Before any *major construction is performed to the existing building, appropriate drawings must be submitted to the Ministry of Labour for their approval and signed by an Engineer.

- Check with the H&S Manager if you need a definition on major.

All "as-built" drawings, permits etc. must be kept on file for the entire life of the building and a copy kept with the H&S Manager.

1.2.2.1 Managers/General Purchasing Managers/Subcontract Account Managers Are Required To

- 1) Retain only competent contractors/subcontractors/vendors/suppliers to conduct work for MDA.
- 2) Obtain a copy of the contractors written health & safety policy as it pertains to the tasks being performed, to ensure OHS Act compliance.
- 3) Inquire as to how chemicals will be transported, handled and disposed of and ensure any hazardous products that are brought on site have a copy of the current MSDS and verified with the H&S Manager. Chemicals containing PCB's or regulated Ozone depleting substances are not allowed on our property. Any unused chemicals must be removed from our property no later than the last day of construction and disposed of according to provincial regulations.
- 4) Copy of the MSDS for any products the contractor is to bring in-house is to be obtained and given to the H&S Manager before the commencement of the work.
- 5) Confirm that the contractor's employees have received the appropriate instruction and training before the work begins.
- 6) Obtain a copy of the contractor's WSIB firm number and a clearance certificate, prior to any work being performed and forward a copy of this to the H&S Manager. Only employees currently covered by WSIB shall be assigned to perform work at MDA.
- 7) Obtain a copy of the contractor's proof of liability insurance prior to any work being performed and a copy forwarded to the H&S Manager.
- 8) Obtain proof that all trades people are properly licensed, where required by provincial regulations.

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- 9) Confirm that the appropriate personal protective equipment will be provided by the contractor and worn.
- 10) Identify the persons responsible for their EHS and who they are to report to.
- 11) Ensure that the contractors receive a copy of HR054 to ensure safe work practices.
- 12) Receive any required permits, before the start of any work and review contracts with contractors to ensure proper documentation. Any hoods, venting, roof top installations, must first have permits before being installed.
- 13) Have signed-off drawings.
- 14) Ensure that the contractor follows MDA's Electrical Safety, Lock-out procedures, stated herein, if applicable, and if working on distribution systems greater than 750 volts or transformers, work must be done in accordance with Electric Utility Operations or Ontario Hydro Corporation Safety rules.
- 15) Inform the contractor where to locate the list of First Aiders and what to do in the event of an alarm sounding.
- 16) Inform the contractor of any known potential work hazards which they may be exposed to.
- 17) Monitor the job and ensure there is sufficient supervision given by the contractor.
- 18) Retain records, permits, etc., in connection with the job, according to applicable requirements.
- 19) Notify the contractor if any safety infractions have been observed and require corrective actions.
- 20) Notify the H&S Manager, in the event that an employee of the contractor has a health, safety or environmental concern with respect to a MDA facility.
- 21) Prepared the contract with clauses that address compliance with Occupational Health & Safety Act, Canadian Environmental Protection Act and regulations, applicable industry standards and MDA's in-house standards.
- 22) Inform the contractor where our chemical storage rooms are located and inform the contractor that they are responsible for their own chemicals as well as disposal.
- 23) Notify the contractor should they be required to enter any restricted area, they must follow our requirements.

1.2.2.2 Health & Safety Manager Is Required To

- 1) File and retain copies of the (WSIB) Workers' Safety & Insurance Board Clearance Certificate and proof of liability insurance before any project is started.
- 2) Assist managers in evaluating contractors EHS program and make recommendations.
- 3) Review with the manager the list of chemicals and hazardous products the contractor is to bring on-site so that the proper MSDSs will accompany the product and the hazardous ingredients reviewed.
- 4) Conduct occasional site assessments and notify the manager of any infractions.

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1.3 Environmental Health & Safety Program Maintenance and Administration

1.3.1 Intended Use or Application

To provide direction using Government Legislation and MDA Executive Management Group, by maintaining and updating the Environmental Health & Safety Manual on a regular basis or as required.

For reference, before and during a project or a program, to ensure understanding of legal compliance and MDA's Health & Safety Program.

WSIB, Workers Safety and Insurance Board, IAPA, the Ministry of Labour, and the Ministry of the Environment notify us of any changes to the legislation and the EHS Manager will ensure compliance.

We are a member of HRPAAO, Human Resource Personnel Association of Ontario, and member of CSSE, Canadian Society of Safety Engineering, NFPA, National Fire protection Association as well as subscribing to other magazines which informs us of any changes we need to be aware of.

1.3.2 Requirements

The effectiveness of the work plans will be evaluated by audits or in the form of an interview to ensure requirements and those objectives have been met.

All designated employees will be trained on how to follow these instructions by E-mail, Intranet or in other training sessions, including WHMIS training.

1.3.2.1 Employees are required to

- 1) Read and understand each related work plan and at the commencement of a project or program follow the guidelines to ensure compliance and employee safety.
- 2) Notify the EHS Manager should an additional work plan be required.
- 3) Inform the EHS Manager with details, should any changes or additions to a work plan be required.

1.3.2.2 Managers are required

- 1) Read and understand each related work plan and at the commencement of a project or program follow the guidelines to ensure compliance and employee safety.
- 2) Ensure their employees understand and know how to access the work plans on the Intranet and that the instructions are followed.
- 3) Notify the EHS Manager should an additional work plan be required.
- 4) Inform the EHS Manager with details, should any changes or additions to a work plan be required.

1.3.2.3 Health & Safety Manager is required to

- 1) Review The Health & Safety Policy annually within the month prior to the expiry date as indicated on the policy. All MDA's workplace postings will be changed to reflect this updated policy including the Vice- President and/or General Managers signature.
- 2) Maintain and Control the Environmental Health & Safety Manual on a regular basis.
- 3) Draft any new work plan as the need arises and review the information with the Joint Health & Safety Committee Members.

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- 4) Review current work plans and make changes as necessary. The revision number and the date will be updated.
- 5) Ensure that any changes to the Government Legislation are met and followed. Also inform Managers and/or employees at MDA, should any change affect their daily routine.
- 6) Ensure that any work plan where a program or other change has occurred will be reviewed, at least annually, by the EHS Manager and the Joint Health & Safety Committee Members.
- 7) Remove from the manual any document which has become obsolete. An E-mail will be sent to Business Process Team to inform them of these changes as well as a copy of any new or revised work plans.

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1.4 Manager and Employee Roles & Responsibilities

1.4.1 Purpose

To assist employees in understanding their role and responsibilities under the Occupational Health & Safety Act as well as MDA's Environmental Health & Safety (EH&S) Program.

Specifically, to understand the responsibilities of the Employer, Employees, Managers/Supervisors, Environmental Health & Safety (EHS) Manager and the Joint Health & Safety Committee. (JHSC)

1.4.2 Scope

As a minimum, the Occupational Health & Safety Program will include the following:

- 1) Joint Health & Safety Committee
- 2) Training and Education
- 3) Accident/ Incident Investigation Reporting and Follow-up
- 4) Facility, Vehicle and Equipment Inspections
- 5) Emergency Preparedness
- 6) Personal Protective Equipment
- 7) Policies and Procedures

Managers will be held accountable for the Health & Safety of their employees, a safe healthy environment, ensuring that machinery and equipment are safe and that employees follow established work practices.

It is the responsibility of each employee to comply with company Environment, Health & Safety policy and applicable legislation for the protection of their health, that of their fellow workers and the natural environment.

It is the responsibility of every employee to promptly report Health & Safety concerns or violations of both the EH & S Policy (HR-POL.016) and this policy, to their supervisor or to the H&S Manager and participate in developing resolutions.

1.4.3 Process

1.4.3.1 Directors and Managers of a Corporation are required to

Take all reasonable care to ensure that the corporation complies with:

- 1) The OHSA Act and the Regulations
- 2) Orders and requirements of Inspectors and Directors
- 3) Orders of the Minister (MOL)

1.4.3.2 Employer is required to

- 1) Develop and maintain policies, programs and procedures that promote employee Occupational Health & Safety.
- 2) Comply and follow applicable government laws and regulations which relate to occupational health & safety.
- 3) Provide education and training to employees to enable them to perform their duties safely.

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- 4) Ensure that equipment, materials and protective devices as prescribed are provided and maintained in good condition.
- 5) Ensure that employees work in a manner and with protective devices, measures and procedures as outlined in the Occupational Health & Safety Act.
- 6) Ensure employees use or wear the equipment, protective devices, or clothing that is required.
- 7) Advise employees of the existence of any potential or actual danger to the Health & Safety of the employee that the manager is aware of and provide written instructions and measures to be taken, where so prescribed.
- 8) Take every precaution reasonable in the circumstance for the protection of a worker.
- 9) Ensure that the facility is maintained to an acceptable level where employees can work safely.
- 10) Ensure that the roof, wall, floor or pillar of any part of a workplace is capable of supporting all loads without causing the material to be over stressed.
- 11) When appointing a supervisor, appoint a competent person, which is a person that is qualified, is familiar with the Act and the regulations that apply to the workplace and has knowledge of any potential or actual dangers in the workplace.
- 12) Acquaint a worker or a person in authority over a worker with any hazard in the work and in the handling, storage, use, disposal and transport of any article, device or equipment.
- 13) Afford assistance and co-operation to a Health & Safety committee representative in the carrying out of their duties.
- 14) Provide to the Health & Safety committee representative the result of any report respecting occupational Health & Safety.
- 15) Only employ in or about a workplace a person over such age as may be prescribed.
- 16) Establish a medical surveillance program for the benefit of workers as prescribed.
- 17) Post, in the workplace, a copy of the Occupational Health & Safety Act and any explanatory material outlining the rights, responsibilities and duties of the workers.
- 18) Prepare and review at least annually a written occupational Health & Safety policy and post in a conspicuous location in the workplace.
- 19) Keep and maintain accurate records of the handling, storage, use and disposal of any agent as prescribed or any records of the exposure to a worker.
- 20) Include in the employees job description the responsibility to comply with all government legislation including the Occupational Health & Safety Act and Regulations; to learn and use safe working procedures in a required manner; to observe and report hazards with the freedom to recommend on ways to improve occupational health, safety and environmental issues.

1.4.3.3 Manager or Person in Charge is required to

- 1) Comply with all applicable government legislation including the Occupational Health & Safety Act and Regulations and the Transportation of Dangerous Goods.
- 2) Learn and use safe working procedures in the required manner.
- 3) Work in a manner, with protective devices, measures and safe working procedures as required by the Act and the regulations.
- 4) Advise a worker of the existence of any potential or actual danger to the Health & Safety of the worker of which the manager or supervisor is aware.
- 5) Where so prescribed, provide a worker with written instructions as to the measures and procedures to be taken for the protection of the worker.
- 6) Take every precaution reasonable in the circumstances for the protection of a worker.
- 7) Use or wear the equipment, protective devices or clothing that the employer requires be using or wearing.

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- 8) Observe, do unplanned inspections and report hazards to the person responsible as well as the EHS Manager. Give recommendations on ways to improve occupational health, safety and environmental issues.
- 9) Hold workers accountable for following regulations, procedures and policies. Failure to do so may result in disciplinary action.
- 10) Participate in the review and modification of any safety documentation.
- 11) Ensure an Inspection Reporting Form HR039, for any new, modified or existing equipment is completed by the EHS Manager. The EHS Manager will be accompanied by a JHSC member and/or any other required person.
- 12) Provide a copy to the EHS Manager should any activity require a permit or a medical, to ensure prescribed standards and requirements are met.
- 13) Include in the employees job description the responsibility to comply with all government legislation including the Occupational Health & Safety Act and Regulations; to learn and use safe working procedures in a required manner; to observe and report hazards with the freedom to recommend on ways to improve occupational health, safety and environmental issues.

1.4.3.4 All Employees are required to

- 1) Comply with all applicable government legislation and company programs which relate to occupational health & safety. Failure to do so may result in disciplinary action.
- 2) Learn and use safe working procedures in the required manner.
- 3) Check the Material Safety Data Sheet (MSDS) before commencing any work using hazardous chemicals.
- 4) Observe and report hazards with recommendations on ways to improve occupational health, safety and environmental issues.
- 5) Use or wear equipment, protective devices or clothing that is required by the employer.
- 6) Report to the employer, the absence of or defect in any equipment or protective device of which they are aware and may endanger themselves or another worker.
- 7) Report to the employer any contravention of the Act or regulation or the existence of any hazard of which they know.
- 8) Immediately report all injuries to your supervisor or EHS Manager.
- 9) Report all accident/incidents to your manager, supervisor immediately.
- 10) Include in their job description the responsibility to comply with all government legislation including the Occupational Health & Safety Act and Regulations; to learn and use safe working procedures in a required manner; to observe and report hazards with the freedom to recommend on ways to improve occupational health, safety and environmental issues.

1.4.3.5 No Employee Shall

- 1) Remove or make ineffective any protective device required by the regulations or by the employer, without providing an adequate temporary protective device. The protective device shall be replaced immediately when the need for removing or making ineffective the protective device has ceased.
- 2) Use or operate any equipment, machine, device or thing or work in a manner that may endanger themselves or any other worker.
- 3) Engage in any prank, contest, feat of strength, unnecessary running or rough and boisterous conduct.

1.4.3.6 A Supplier Is Required To

Ensure that any machine, device, tool or equipment under any rental, leasing or similar arrangement for use in or about a workplace:

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- 1) is in good condition,
- 2) complies with this Act and the regulations,
- 3) will be maintained in good condition, if it is the responsibility under the rental, leasing or similar arrangement to do so.
- 4) Ensure that contractors work in a safe manner and meet the required legislation and company requirements. Contractor or subcontractor must notify MDA of any changes including changes to their personnel staff, performing the work.

1.4.3.7 Environmental Health & Safety Manager Is Required To

- 1) Be familiar with the Act and Regulations.
- 2) Report directly to a senior manager.
- 3) Maintain any safety equipment and ensure proper maintenance.
- 4) Develop and maintain any EHS programs, policies and procedures to ensure a safer workplace.
- 5) Provide assistance to any safety issues or concerns.
- 6) Ensure that safety training is provided.
- 7) Review and inform management on EHS legislation and its impact on the corporation.
- 8) Maintain records as outlined by legislation and the company.
- 9) Approve Workplace Hazardous Material Information System (WHMIS) controlled chemicals and review Material Safety Data Sheets (MSDS).
- 10) Maintain WHMIS inventory and update MSDS's.
- 11) Provide WHMIS training to employees.
- 12) Investigate any incidents or injuries as well as employee concerns.
- 13) Ensure that government legislation is being followed and that employees work in a safe manner, as required.
- 14) Be a member of the Joint Health & Safety Committee and hold a certified WSIB certificate.
- 15) Conduct planned or unplanned workplace inspections.
- 16) Prepare a written injury analysis annually and make it available to management and the Joint Health & Safety Committee.
- 17) Provide Health & Safety information to employees during orientation.
- 18) Participate in the review and modification of any health & safety documentation.

1.4.3.8 Joint Health & Safety Committee Members Are Required To

- 1) Work in compliance with the Occupational Health & Safety Act and Regulations.
- 2) Take an active role in the protection and promotion of the Health & Safety of all employees.
- 3) Be given time, paid by the employer, to attend meetings, to perform their duties and time to prepare for a safety meeting, if necessary.
- 4) Have at least four people on the committee, at least half the members at the workplace who do not exercise managerial functions.
- 5) Meet at least once every three months.
- 6) Have meetings co-chaired by one worker and one management member.
- 7) Maintain and keep minutes of its proceedings and make the same available for examination and review by an inspector.

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- 8) Do a physical workplace inspection monthly of at least part of the workplace and the total premises at least once a year.
- 9) Identify situations that may be a source of danger or hazard to workers and make recommendations or report the findings to the employer, workers and trade unions representing the workers.
- 10) Make recommendations to the employer and the workers for any improvement of the Health & Safety of workers.
- 11) Get information and assistance from the employer and workers, as required for the purpose of carrying out an inspection of the workplace.
- 12) Have at least one certified member representing the employer and one certified member representing the workers.
- 13) Have at least one selected designated certified member (where there is more than one certified) who becomes solely entitled to exercise the rights and to perform the duties under the Act.
- 14) Be present at a workplace investigation where a worker is killed or critically injured from any cause and inspect the place where the accident occurred.
- 15) Designate one worker member to:
 - Be present at the beginning of any industrial hygiene testing conducted if the member believes his presence is required to ensure the test results are valid.
 - Be made available without delay, in any circumstances, of a refusal to work, in the presence of a supervisor who shall investigate the refusal to work.
 - Accompany an inspector during Ministry of Labour inspections or investigations.
- 16) Keep the employee informed of steps that are being taken, should that employee report a safety concern.

1.4.3.9 Reporting Requirements

Health & Safety Committee Facility Inspections

- 1) Upon completion of the joint Health & Safety committee inspection, a report will be developed detailing all substandard acts and/or conditions observed.
- 2) Copies of the report, including any recommendations, are to be distributed to all managers concerned.
- 3) Managers are to take appropriate action necessary to rectify any substandard conditions and/or acts encountered in their respective areas.
- 4) Managers shall report in writing, within three weeks of the receipt of the Inspection, report any action taken and date of completion, or action to be taken and date of completion, or action to be taken and target date. Where the Manager feels action cannot be taken, within three weeks, he/she shall notify the Health & Safety Committee of the circumstances surrounding the lack of action.

1.4.3.10 Posting Requirements

- 1) The company shall post the results of any environmental test or surveys conducted. This includes air sampling and noise level testing.
- 2) The Ministry of Labour orders and inspection results shall be posted.
- 3) A copy of the Act and any explanatory material prepared by the Ministry, outlining the rights, responsibilities and duties of the workers, must be posted.
- 4) Post at a conspicuous location in the workplace a copy of the occupational Health & Safety policy.
- 5) Post a workers' compensation board poster, "In all cases of injury".
- 6) Safety Bulletin Board must include:

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- Joint Health & Safety Committee members' names and telephone extensions.
 - Emergency Response Team names and telephone extensions.
 - Fire Wardens and Assistant Wardens names and telephone extensions
 - JHSC current monthly meeting minutes.
 - Ministry of Labour's order, if applicable, until the actions are completed.
- 7) Post MDA's 3-R Workplan; Recycle, Reuse, Reduce.

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1.4.4 Schedule "A" – Reporting of a Workplace Environmental, Health & Safety Concern

Responsibilities of both management and employees where there is a specific environmental health & safety concern in the workplace.

Where an *employee* has a concern regarding safety in the workplace, whether it relates to the work being performed, equipment, personal protective devices, the existence of a potential hazard, or a contravention of the Occupational Health & Safety legislation, the employee *must immediately* report this concern to his/her manager. If the manager cannot be located, the employee must report this concern to the manager's manager/director or, in the event that none of these people are available, to the EHS Manager.

The *manager* is required to investigate the situation. It is recommended that the manager seeks assistance from the EHS Manager in completing the investigation. The supervisor is required to keep the employee informed and advise the employee of the results of the investigation.

There are certain circumstances where an employee may refuse to work or do particular work for reason of health or safety.

Where a work refusal occurs, the manager is required to perform the investigation *IMMEDIATELY* in the presence of the employee and one of the following:

- 1) the Health & Safety Manager
- 2) A member of the Joint Health & Safety Committee who represents the employee.

If a work refusal occurs, please contact Health & Safety Manager immediately to ensure that you follow the required process.

1.4.5 Schedule "B" – Working Alone

"Working alone" can be defined as having no other individual nearby or within shouting distance. In Ontario there is no specific regulation concerned with working alone, hence it is permitted and widely accepted although the Industrial Regulations specify a minimum number of workers for specific hazardous work condition like confined space entry or working on electrical conductors. Reliance is placed on the employer's general duty to take all reasonable precautions for the health and safety of the worker. Working alone is acceptable at MDA, even after hours, but you should adhere to the following safety precautions.

If you are working with or on a particular machine, know how the machine works and protect yourself from the hazards of: conveyors, saws and cutters, presses, elevators, moulding equipment, robots etc.

- There could be:
 - Rotating Action
 - Cutting Action
 - In-Running Nip Points
 - Punching/Shearing or Bending Actions
 - Vibration
 - Electric Power
 - Other Hazards including kickback, hot metal, gases, vapours, broken blades, sharp edges, rough surfaces, heat, wood chips, splinters.
 - Unexpected start-up
- If you are working alone, notify another individual in the building, if possible, and have that person check-in on you every few hours, depending on the activity and the environment.
- You must take responsibility for the safe operation of the machinery, tools and facility.
- You should be aware of telephone numbers of contacts to call, in an emergency situation.
- Wear all necessary protective gear and clothing.
- Long hair must be tied securely.
- Remove all personal accessories, such as rings, watches, jewellery etc.
- Any loose clothing must be removed and open jackets are to be fastened.
- Never leave a machine running unattended.
- Keep your hands well away from any point of contact between the work piece and the machine.
- Ensure that you are familiar with the work to be done before you start operations and take the time to safely operate the machine or tool.
- Make sure all machine guards are in working order. Do not bypass any guard.
- Follow the lock-out procedure, when required.
- Keep the area neat and tidy.
- If you feel a machine is unsafe or if there is an unsafe condition, or if any instruction is unclear, talk to your manager immediately.

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1.5 Joint Health & Safety Committee

1.5.1 Intended Use Or Application

To stimulate safety awareness with an atmosphere of co-operation between all parties. To ensure that Health & Safety concerns are brought out into the open, worked on, and resolved within a reasonable length of time. In our daily operations, along with legislative requirements as outlined in the Occupational Health & Safety Act and Regulations.

1.5.2 Requirements

The JHSC itself does not have the authority to direct, but does have the responsibility to identify and make recommendations for improvements of the Health & Safety of workers, recommend maintenance and monitoring of programs, measures and procedures respecting the Health & Safety of workers.

Obtain information respecting the identification of potential or existing hazards of materials, processes or equipment as well as health & safety experience and work practises and standards in similar or other industries of which the employer has knowledge.

Obtain information concerning the conducting or taking of tests for the purpose of Health & Safety and be consulted about and have a designated member representing workers be present at the beginning of testing, in or about the workplace if the designated member believes his or her presence is required.

Every effort shall be made to ensure regular attendance of each JHSC Committee member. Any other duties or responsibilities as may be required, under the Occupational Health & Safety Act and Regulations.

Unplanned inspections are also welcomed by Directors, Managers and all employees. You may be accompanied by the EHS Managers, or you may report your findings to the EHS Managers who will follow up on corrective actions. Refer to Schedule "A" should you need a guideline for workplace inspections.

1.5.2.1 Joint Health & Safety Committee Is Required To

- 1) Take an active role, make recommendations in the protection and promotion of the Health & Safety of all employees, as well as maintain and monitor programs.
- 2) Have at least one member representing the workers and at least one member representing the employer who shall be certified.
- 3) Identify, make recommendations and report findings to the Employer and the Health & Safety Manager.
- 4) Inspect the workplace, along with a management representative, at least once a month. Talk to employees for their concerns, if any, during the inspection.
- 5) Conduct regular safety inspections, during the course of the day. Identify to the appropriate people, any sources of danger or hazards to the workers.
- 6) Attend all scheduled monthly meetings but if that member is unable to attend, an alternate is to take his/her place.
- 7) Obtain a quorum, in order to proceed with the meeting. If one worker or management member or their alternate, is unable to attend, the meeting may proceed. If there is to be any voting, then the meeting will have to be rescheduled until all members can be present.
- 8) Co-chair the committee meetings. One member selected by the members who represent the workers and one selected by members who exercise managerial functions.
- 9) Keep the employee informed of steps that are to be taken, if an employee has expressed a safety concern.

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- 10) Talk to Managers/Supervisors and employees in order to help or identify safety concerns, which might be otherwise overlooked.
- 11) Advise the manager on any JHSC activity that will take you away from your normal duties. If permission cannot be granted then the member must inform the manager that the EHS Manager will be contacted.
- 12) Obtain information, if required, concerning tests conducted on any equipment, machine, device or thing. Be present, if required at the beginning of a test.
- 13) Review information on accident/injuries at the committee meetings and give recommendations so as not to have a similar injury occur.
- 14) Investigate incidents involving a critical injury along with the EHS Manager.
- 15) Prioritize workplace inspection concerns with an A, B, C, ("A" being the most serious). See schedule "B". Recommend a corrective action as well as a follow-up date. "A" items will be followed up immediately with the person responsible for correction.
- 16) Carry forward items on the inspection list that cannot be completed within 21 days along with a written reply from management, on why the item is not completed. If after a reasonable timeframe, decided by the committee, that an item has not been corrected then the committee will notify the EHS Manager who will notify the person responsible, usually a manager, and give a set time for completion.
- 17) Treat information received as confidential and only discuss among other JHSC members. Ministry of Labour reports are posted, if issued, and the JHSC is made aware of such reports or orders.
- 18) Adhere to any other requirement as outlined in the Act & Regulations.
- 19) Notify the EHS Manager if you are going to be off-site and not able to carry out your normal JHSC member responsibility.

1.5.2.2 Joint Health & Safety Certified Member is required to

- 1) Co-chair committee meetings, as required.
- 2) Conduct workplace inspections.
- 3) Assist in the investigations of work refusals.
- 4) Investigate reports where dangerous circumstances exist.
- 5) Follow the work refusal regulation should it be necessary.
- 6) Adhere to all of the above requirements for the JHSC.
- 7) Participate in the investigation of all critical injuries with the EHS Manager who will report the findings to the Ministry of Labour.

1.5.2.3 Managers are required to

- 1) Provide time deemed necessary for the JHS Committee members for meetings, workplace inspections and preparation time so that their duties would be successfully carried out.
- 2) Notify the EHS Manager if any JHSC Members will be off site for 3 months or greater.
- 3) Correct any item on the workplace inspection report, sent out by the EHS Manager, after it has been identified, within 21 days. If the item cannot be corrected within this time frame then the manager must contact the EHS Manager with an explanation and a new date for completion.
- 4) Present contractors with MDA Health & Safety requirements and ensure they are followed.



1.5.2.4 Health & Safety Manager is required to

- 1) Establish and maintain a Joint Health & Safety committee at the workplace.
- 2) Ensure at least one member of the committee representing the employer and at least one member representing the workers shall be certified.
- 3) Provide such information and assistance as the member may require for the purpose of carrying out an inspection in the workplace.
- 4) Post at the workplace, the names and work locations of the committee members in a conspicuous place.
- 5) Adhere to any other requirements as outlined in the Occupational Health & Safety Act and Regulations.
- 6) Maintain and keep minutes of meetings and its proceedings and do not destroy until written approval is received from the corporation.
- 7) Prepare minutes from the JHSC Meeting within the week after the meeting and forward to the JHS Members as well as a copy to HR Assistant for posting. Copy must be forwarded to the HR Director, EHS Manager and to the manager responsible for any corrective item.
- 8) Follow up with "A" items to ensure the person responsible will correct it immediately.
- 9) Assess potential hazards of contractors/subcontractors doing work on site and update the JHSC as required.
- 10) Advise the JHSC about monitoring or tests which will be conducted and the report will be reviewed at the JHSC Meeting.
- 11) Be a resource and assistance to the JHSC as deemed necessary. To resolve any concern long with the employee and their manager.

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**1.5.3 Schedule "A" – Joint Health & Safety Committee Inspection Checklist**

Area: _____

Date: _____

Time: _____

Inspected By: _____

Check List	Checked	Observations
A. General Workplace Conditions		
Aisles (Clear & sufficient walkway)		
Floors (Walking & Working Surfaces)		
Ladders stored properly		
Stairs		
Stairwell lighting		
B. Facilities		
Lighting (Appears Sufficient)		
Ventilation (Appears Acceptable)		
C. Materials		
Chemicals and Solutions		
Compressed Air		
Stacking, Piling and Storage		
Waste Disposal		
D. Equipment		
Guarded		
Guard needs adjustment		
Maintenance		
E. Electrical Equipment		
Clear path of 36" to the Hydro Panels		
Hydro Panel clearly marked		
Loose wires		
Proper Grounding		
Properly Locked-Out, if applicable		
Switch plates		
F. Hazard Controls		
Properly Labelled		
Signs and Tags		
G. Emergency Systems		
Emergency Exit Lights		
Eye Bath and Emergency Showers		

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Check List	Checked	Observations
Fire Extinguishers		
First Aid Kits Accessible (1st Floor)		
Sprinkler Heads Clear		
H. Personal Protective Equipment		
Face shield		
Gloves or Aprons		
Hearing Protection		
Safety Belts		
Safety Footwear		
Safety Glasses		
Safety Hats		
I. Health Hazards		
Dust/Gases/Fumes/Smoke		
J. Kitchen & Cafeteria		
K. Housekeeping Issues		
Other		

Persons I contacted during the inspection:

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1.5.4 Schedule "B" – Hazard Classification Priority

Class "A"

A condition or practise likely to cause permanent disability, loss of life or body part and/or extensive loss of structure, equipment or material.

Class "B"

A condition or practise likely to cause serious injury or illness (resulting in temporary disability) or property damage that is disruptive, but less severe than class "A".

Class "C"

A condition or practise likely to cause minor (non disabling) injury or illness or non disruptive property damage.

Class "H"

Housekeeping issue which presents an unsafe situation or promotes a health concern.



1.5.5 Schedule "C" – Joint Health & Safety Committee Members

Member	Alternate	Local
One elected worker member	Stand-by person	CAW 112
One elected worker member	Stand-by person	CAW 673
One elected worker member	Stand-by person	SPATEA
EH&S Manager	HR Manager	Management Rep.
		Management Rep.
		Management Rep.

Quorum

JHSC member is required to attend all the Scheduled Health & Safety Meetings. If a member is unable to attend, then that member must notify the alternate to attend and inform the EHS Manager the day before the meeting.

If one worker member or one management member is unable to attend, the meeting may still be in order. The number of management members shall not be greater than the worker members, if there is any voting to be decided upon. Alternates are chosen and required to fill in if the regular member cannot attend.

Attendance

If a JHSC member has not attended two consecutive meetings, favourable consideration will be given, by the committee, to replace that individual, unless the individual has been medically treated.

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1.5.6 Schedule D – Incident Reporting

To: _____ JHSC Member: _____
Date: _____ Time: _____
Reported: _____ Witness: _____
Manager/
Supervisor: _____

Incident:
(How,
When,
Where)

Preventative
Measures:

Follow-up:

Date: _____ EHS Manager: _____

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1.6 Ministry Visits, Inspections, Work Refusals and Investigation

1.6.1 Intended Use or Application

To provide a guideline when the Ministry of Labour/Environment, Workers' Compensation (WSIB) representatives or any other visitor asking for Health & Safety information or the EHS Manager, will be directed to the correct contact person.

When workplace information on Health & Safety is required, the Health & Safety Manager will respond to any order, inspection tour, work refusal or any other issue with the appropriate Certified Joint Health & Safety Representative, depending upon the circumstances.

1.6.2 Requirements

Receptionist and security guard has been provided with a list of contact names and telephone extension numbers to ensure an immediate response. Schedule "B"

Reason for Inspections:

- 1) Response received by the ministries from employees on a complaint or to assist in resolving a concern.
- 2) High injury and illness incident rates
- 3) Critical injury investigations
- 4) Follow up to previous visits

1.6.2.1 Receptionist Is Required To

- 5) Contact immediately the Health & Safety Manager when the

Ministry of Labour/Environmental inspector arrives, who will then contact the JHSC co-chair. If the EHS Manager is not available, then see Schedule "B", Visitor Notice.

1.6.2.2 Health & Safety Manager Is Required To

- 1) Contact a Joint Health & Safety Representative to accompany the Minister of Labour and EHS Manager, depending upon the nature of the visit.
- 2) Respond to any order, correspondence or closure of issues addressed by the Minister of Labour/Environment or any other Safety Organization in regards to Health & Safety.
- 3) Make available any health & safety documents the Government Official requests for an inspection or audit.
- 4) Post at the workplace any Minister of Labour's orders in a conspicuous place and a notice of the response completed by the date issued on the order, if applicable.
- 5) Ensure the information in schedule "A" is posted and kept up to date.
- 6) Take detailed notes of inspector's comments and suggestions.
- 7) Make all efforts to resolve issues with management, during the inspection to avoid having formal orders issued under the Act and Regulations.
- 8) Hold close out meetings with inspector to discuss findings, orders and appropriate corrective actions and time frames but do not commit to these until in house resources have conducted an assessment. Discuss your position on the orders at this time.
- 9) Provide copies of the inspectors notes and orders to

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- General Manager
 - JHSC Co-Chair
 - EHS bulletin board
 - Any other person which may be responsible for corrective actions.
- 10) Provide a final written letter to the ministry office stating how the orders were complied, on or before the recommended date, with a copy to the names in (9).

1.6.2.3 Managers are required to

- 1) Complete the work identified on Minister of Labour's or Minister of Environment orders by the required deadline and report to the EHS Manager when the work is completed.

1.6.3 Instructions Required For A Work Refusal

"A worker may refuse to work or do particular work where he or she has reason to believe that:

- 1) any equipment, machine, device or thing the worker is to use or operate is likely to endanger himself, herself or another worker;
- 2) the physical condition of the workplace or the part thereof in which he or she works or is to work is likely to endanger the worker; or
- 3) any equipment, machine, device or thing he or she is to use or operate or the physical condition of the workplace or the part thereof in which he or she works or is to work is in contravention of the Occupational Health & Safety Act or the regulations and such contravention is likely to endanger himself, herself or another worker." Occupational Health & Safety Act & Regulations (Section 43)

No employer or person acting on behalf of an employer shall:

- dismiss or threaten to dismiss a worker
- discipline or suspend, impose any penalty, intimidate or coerce an employee where an employee has a right to refuse or to stop work because their health & safety may be in danger.

1.6.3.1 Employee Is Required To

- 1) Promptly report to the manager, if the employee feels that his safety is threatened, with the circumstances of his/her concerns and the reason of the refusal to work.
- 2) Remain in a safe place near the work station, while the investigation is being conducted.
- 3) Request a further investigation, should he/she have reasonable grounds to continue to feel his/her safety is still threatened.

1.6.3.2 Manager Is Required To

- 1) Investigate the work refusal in the presence of the employee, the Health & Safety committee member who represents the employee and the EHS Manager.
- 2) Make every attempt possible to correct the situation.
- 3) Notify the Ministry of Labour, should the employee still continue to refuse to work and believe his/her safety is still threatened.
- 4) Wait for the decision of the inspector until any worker can be assigned to use or operate the equipment, machine, device or thing which is being investigated.
- 5) Pay the employee at the appropriate regular or premium rate.

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- 6) Possibly assign reasonable alternate work or give other instructions, to the employee, pending the investigation decision.
- 7) Ensure the employee is present during the entire investigation stage.

1.6.3.3 Minister of Labour Is Required To

- 1) Investigate the refusal to work in the presence of all above mentioned parties and give their decision in writing to the employee, employer and the safety committee member as soon as is practicable. Their decision is binding on all parties.

1.6.4 Schedule "A" – Checklist of Information Required for Posting

- 1) Health & Safety Policy.
- 2) Provincial Occupational Health & Safety Act and Industrial Regulations.
- 3) WSIB poster, In All Cases of Injury. (Form 0082)
- 4) Joint Health & Safety Committee members and their telephone extensions.
- 5) First Aid Trained Personnel and telephone extension.
- 6) Emergency Response Team Contacts and telephone extension numbers.
- 7) Fire Warden and Assistant Wardens names and telephone extension numbers.
- 8) Emergency Telephone Numbers.
- 9) JHSC committee current monthly meeting minutes.
- 10) Location map of fire routes, exits and fire extinguishers. Hazardous rooms, fire pull stations or any other special facility.
- 11) An updated Contact list available at the receptionist.
- 12) 3R workplan.
- 13) Minister of Labour's Order, if applicable. (posted until actions are completed)
- 14) Annual WSIB Analysis Report.



1.6.5 Schedule B – Visitor Notice

- Ministry of Labour Representatives
- Ministry of Environment Representatives
- Workers' Safety & Insurance Board Representatives
- Any Safety Representative, including IAPA, Fire Department etc.

Contact:

Health & Safety Manager

If not available, contact:

Director of HR

Delegate for Director of HR

Please contact a worker representative and the worker rep Co-chair of the Joint Health & Safety Committee:

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1.7 Orientation

1.7.1 Intended Use Or Application

To assist employees in becoming familiar with their new surroundings and co-workers. To give information to the employee so that he/she can work in a safe manner and become familiar with the required responsibilities as outlined in each Environmental Health & Safety (EHS) Workplan. These workplans are available on the Intranet under Human Resources.

1.7.2 Requirements

Orientation may consist of different sessions and training.

WHMIS (Workplace Hazardous Material Information System) is a legal requirement and responsibility of the employer to provide training for each of their employees on WHMIS, even if similar training has been provided by an employee's previous employer. In this training employees become familiar with the following:

- First Aid & CPR Trained Contacts
- Joint Health & Safety Committee Members
- Emergency Response Team
- Fire Wardens and Assistant Fire Wardens
- Emergency procedures and Exit routes

A session of Roles and Responsibilities is also conducted for new hires in regards to the Ministry of Labour (OHS) Occupational Health & Safety Act and Regulations.

An Orientation day is conducted by which VP's or Managers of different areas describe the functions of their department with an overview of activities for information purposes.

1.7.2.1 Employees Are Required To

- 1) Obtain their manager's permission and attend the scheduled orientation session.
- 2) Participate in the orientation session by asking questions or raising concerns they may have.
- 3) Sign a training Activity Form with your employee number so the EHS Manager and H.R. may keep a log of employees who attended the session.
- 4) Use the charge number as instructed when preparing your time card for the week.
- 5) Use the information learned in the training session to protect their health & safety and that of a co-worker.

1.7.2.2 Managers Are Required To

- 1) Ensure that each of their employees have received WHMIS training from the EHS Manager within two to three months of being hired or transferred.
- 2) Allow their employees to attend orientation training, unless it presents a hardship, in which case the employee may attend the next session. The EHS Manager must be notified in advance should an employee not be able to attend.
- 3) Contact HR should an employee be transferred from one department to another so that required training can be reviewed.
- 4) Inform their employee of any known hazards in that area of which you are responsible.

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1.7.2.3 Health & Safety Manager Is Required To

- 1) Organize and prepare an orientation agenda for new hires or transferred employees, if required.
- 2) Present specific training to new employees within two to three months of commencing employment.
- 3) Maintain a record of training activities and request names with employee numbers on an Activity Form which is filed and logged into the HRIS system.
- 4) Be available to answer questions or concerns an employee may have on orientation training or any other training material.

1.7.2.4 Human Resources Are Required To

Provide names, date of hire or transfer, promotions, department and position title to the Health & Safety Manager. This information will be used to set up required future training sessions.

1.8 Procedure Requirement (Safety Risks)

1.8.1 Intended Use Or Application

To ensure that safe handling measures are incorporated into our standard operating procedures. To ensure that any recommended policy or procedure is reviewed by the EHS Manager, managers, the Joint Health & Safety Committee and to ensure compliance with relevant legislation and that any required training is scheduled.

When the need for a procedure or a safety risk is identified, this work instruction will describe the process to ensure that appropriate Environmental Health & Safety measures are addressed in the procedure.

Additional procedures will be in place to ensure injury prevention or for information or reports required by government or MDA.

1.8.2 Requirements

1.8.2.1 Manager or Person in Charge Is Required To

- 1) Identify the work that is to be performed.
- 2) Identify any potential hazards and any known method of controlling these hazards.
- 3) Ensure the worker complies with the OHSA Act and regulations as well as the company policies and procedures.
- 4) Work with the EHS Manager to ensure training is identified and scheduled.
- 5) Identify any potential hazard or risk that you may be aware of and advise the worker.
- 6) Ensure the employee understands the procedure and the safe measures to follow.
- 7) Take every precaution reasonable in the circumstances for the protection of the worker.
- 8) Ensure that any equipment, protective devices or clothing required by MDA is used or worn by the worker.

1.8.2.2 Health & Safety Manager Is Required To

- 1) Prepare a procedure incorporating responsibilities and a method of reporting in the event of an incident or injury.
- 2) Review the procedure with the responsible person/s if the process changes or if a review is requested.
- 3) Provide or schedule training for the employees involved and record names and the date of attendance, after manager's approval.
- 4) Monitor compliance on a regular basis with the responsible person/s.

1.8.2.3 Employees Are Required To

- 1) Attend the training provided and follow the safety procedures as required.
- 2) Identify and report any known hazards to your manager or supervisor.
- 3) Report to the EHS Manager any changes in the method or current procedure.
- 4) Work in compliance with the Act and Regulations.
- 5) Use or wear any equipment, protective devices or clothing required by the employer.
- 6) Use or operate any equipment or work in a way that may not endanger yourself or another worker.
- 7) Ensure there is no food or drink consumption if working in any of the Labs or in or around machines in the mechanical lab.

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- 8) Comply with government regulations, company procedures and work safely 100% of the time.

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1.8.3 Schedule "A" – Hot Work Permit

This hot work permit is required for any temporary operation involving open flames or producing heat and/or sparks. This includes, but is not limited to: brazing, cutting, grinding, soldering, thawing pipe, torch applied roofing and welding.

Hot work performed by:

(Name): _____ Signature: _____

Nature of Work being done: _____

Location: _____ Date: _____

I verify that the above location has been examined, the precautions checked on the required precautions checklist have been taken to prevent fire, and permission is authorized for this work.

Date: _____ Signature: _____

<input type="checkbox"/> Hot work equipment in good repair.
<input type="checkbox"/> Flammable liquids, dust, lint and oily deposits removed.
<input type="checkbox"/> Explosive atmosphere in area eliminated.
<input type="checkbox"/> Floor swept clean.
<input type="checkbox"/> Remove other combustibles where possible. Otherwise protect with fire-resistant tarpaulins, metal shields or wet/damp sand.
<input type="checkbox"/> Fire-resistant tarpaulins suspended beneath work.
<input type="checkbox"/> All wall and floor openings covered.
<input type="checkbox"/> Protect or shut down ducts and conveyors that might carry sparks to distant combustibles.
<input type="checkbox"/> Suitable fire extinguisher is available.
<input type="checkbox"/> Trained in the proper use of fire equipment and in sounding of the pull station.
<input type="checkbox"/> Body watch available.
<input type="checkbox"/> Fire Watch will be provided during and for 60 minutes after work, including coffee or lunch breaks.
<input type="checkbox"/> Monitor Hot Work area for up to 4 hours after job is completed
<input type="checkbox"/> Other precautions taken:

Please return completed form to the FHS Manager

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1.9 Record Retention and Distribution

1.9.1 Intended Use Or Application

To ensure that any information is retained and filed in such a way as to comply with regulations for furnishing reports, information, or permanent records to the government or for legal purposes in-house. To provide historical data related to site Environmental Health & Safety (EHS) matters.

When there is a need to ensure that procedures, inspections etc. have been followed in a given situation, or any reports which need to be reviewed on a regular basis, there must be a central location to retain these records for a prescribed period of time or any requirements that must be submitted to the government. Whenever a permit is required to do a specific task or operation.

1.9.2 Requirements

Any Health & Safety issue, program, inspection, committee meetings and test reports are kept in the EHS files for a minimum of at least one year or such longer period as is necessary to ensure that at least the two most recent reports or records are kept. Copies of these reports are forwarded to those responsible for that area or program.

All employees have excess to MDA's Safety & Health Instructions electronically and must be accountable to follow these procedures as outlined.

1.9.2.1 Employees Are Required To

- 1) Obtain and forward a copy of any permit, (before the commencement of any work) document received for preventive maintenance or inspections of any equipment and machinery to the EHS Manager.
- 2) Send a copy of the attendance sheet for any in-house health & safety training to the EHS Manager and a copy of the course outline, should the instruction be given outside of MDA.
- 3) Report any injury in the workplace to the EHS Manager of which a form will be completed and sent to WSIB, Workers safety and Insurance Board. A copy will remain on file.
- 4) Any report, summary or document referring to environmental Health & Safety must be reviewed with, and a copy forwarded to the EHS Manager.
- 5) Obtain written authorization from the EHS Manager before copies of any reports or records are destroyed.

1.9.2.2 Managers Are Required To

- 1) Obtain and forward a copy of any permit, (before the commencement of any work) document received for preventive maintenance or inspections of any equipment and machinery to the EHS Manager.
- 2) Send a copy of the attendance sheet for any in-house health & safety training to the EHS Manager and a copy of the course outline, should the instruction be given outside of MDA.
- 3) Report any injury in the workplace to the EHS Manager of which a form will be completed and sent to Workers Safety and Insurance Board. A copy will remain on file.
- 4) Any report, summary or document referring to environmental Health & Safety must be reviewed with, and a copy forwarded to the EHS Manager.
- 5) Obtain written authorization from the EHS Manager before copies of any reports or records are destroyed.

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1.9.2.3 Health & Safety Manager Is Required To

- 1) Maintain any permits, documents, assessments or surveys which the manager supplies and a copy will be kept on file.
- 2) Post any reports from the Ministry of Labour, or other government agencies, on the bulletin board for a short period of time, as usually specified, and then filed in the EHS department.
- 3) Keep on file any Health & Safety meeting minutes or any safety related issue or concern for a minimum of 10 years or as required by law.



1.10 Safety Training

1.10.1 Intended Use Or Application

To identify employee safety training needs to ensure that proper information and instructions are provided to the employee in the performance of the job.

Annually, Health & Safety training needs will be reviewed, identifying the needs for training programs for employees, managers, supervisors and JHS committee members.

1.10.2 Requirements

Health & Safety Training attendance records are kept on file in EHS department and on the HRIS System.

1.10.2.1 Employees Are Required

- 1) Participate in training as required and to apply skills and knowledge acquired on the job.
- 2) Identify any training to the manager, they feel could assist them in better performing the job, safely or more accurately.

1.10.2.2 Managers Are Required

- 1) Identify and possibly assist in the necessary training for employees as well as on new equipment, processes, etc.
- 2) Inform the EHS Manager what safety training is required, so that a schedule can be prepared and arranged.
- 3) Notify the EHS Manager of any training that your employee may be attending and once the course is completed, provide the certificate and/or information on the course so that the details may be recorded and kept on file.

1.10.2.3 Health & Safety Manager Is Required To

- 1) Perform annually, as a minimum, needs analysis to determine what safety training requirements should be identified.
- 2) Determine the length of course necessary to accomplish the desired goal.
- 3) Determine if an in-house trainer has the knowledge and if not then identify and use an appropriate external source.
- 4) Determine the required frequency of the course.
- 5) Prepare a safety training calendar for the year and monitor progress to schedule.
- 6) Coordinate with the departmental managers to ensure what training is required and establish a training schedule.
- 7) Gather feedback from the course to monitor each session and determine if any changes or amendments are necessary.



1.11 Work Refusal

1.11.1 Intended Use Or Application

To outline to employees the route they must follow, in the process of a work refusal, should they have reason to believe there is an unsafe or dangerous circumstance.

When there is reason to believe that any equipment, machine device or thing he or she is to use or operate or the physical condition of the workplace or the part thereof in which he or she works or is to work is in contravention of the Occupational Health & Safety Act or the regulations and such contravention is likely to endanger himself, herself or another worker.

1.11.2 Other

There are certain circumstances where an employee may refuse to work or do particular work for reason of health or safety.

Where a work refusal occurs, the manager is required to perform the investigation IMMEDIATELY in the presence of the employee and one of the following:

- 1) the EHS Manager
- 2) a member of the Joint Health & Safety Committee who represents the employee.

If a work refusal occurs, please contact the EHS Manager immediately to ensure that you follow the required process.

Work stoppages may be initiated in two different ways: Bilateral and Unilateral (OHSA Section 45, 47). In both cases Dangerous Circumstances must exist.

Dangerous Circumstances are defined as:

a provision of the O.H.S. Act or regulations is being contravened and the contravention poses a danger or hazard to the employee and the danger or hazard is such that any delay in controlling it may seriously endanger the employee.

1.11.2.1 Instructions

Phase One of a work refusal

- 1) Conduct an investigation of all work refusals by:
 - a) Determining the reason for the work refusal
 - b) Directing an employee to a safe area until an investigation is carried out.
 - c) Contact JHSC worker and management designated members, EHS Manager or any technical staff required to resolve the work refusal.
 - d) Investigate in detail the reason for the work refusal by determining what the hazard is, any previous history surrounding the refusal
 - e) Determine suitable corrective actions and person responsible for the corrective actions, along with a time frame.
- 2) If a resolution is reached, re-assign employee to other duties until corrective actions are implemented.
- 3) If the inspection team determines the worker does not have reasonable grounds to believe he/she is in danger, the worker must be instructed to return to work. If the employee is not satisfied with this response, then proceed to **Phase Two**.

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Phase Two of a work refusal (where a resolution cannot be reached)

- 4) Notify General Manager (or designate) if a resolution cannot be reached.
- 5) Contact the Ministry of Labour if the investigation team cannot agree on the existence of a hazard, the corrective action or time frame for implementation or if the affected employee is not satisfied with the teams' resolution.
- 6) Obtain MOL's permission to re-assign employee to reasonable, alternate work, or other directions until the MOL has completed the investigation.
- 7) If any employee is to be re-assigned to the work under investigation, it must be done in the presence of the JHSC designated member and the EHS Manager.
- 8) MOL inspector's decision is final.
- 9) Implement corrective actions determined appropriate by the MOL inspector.
- 10) Document all events surrounding the work refusal and provide a report to the General Manager, JHSC, EHS Manager and the employee.

1.11.2.2 Employees Are Required

- 1) Report promptly, the circumstances of his or her concerns or refusal to work to the employer/ manager who shall investigate the report in the presence of the employee and one of the following:
 - a) a committee member who represents employees, (if possible the certified member) who shall be made available and who shall attend without delay.
 - b) Health & Safety Manager
- 2) Remain in a safe place near his/her work station, while the investigation is being conducted. Every attempt will be made to correct the situation to the satisfaction of the employee and (a) or (b) above.
- 3) Participate in the investigation and provide background information surrounding the hazardous condition.
- 4) Return to work if resolution is agreed upon and corrective action is implemented.
- 5) Refuse work following the investigation, if he/she still has grounds to believe the problem has not been corrected. At this point, follow Phase Two of the work refusal.
- 6) Remain in a safe area if a resolution cannot be reached, until the MOL inspector has been contacted and a time set for the investigation.
- 7) Accept re-assigned duties until investigation by the MOL has been completed.
- 8) Return to work when the recommended corrective actions are implemented, as the MOL inspector's decision is final and binding. Should you still refuse to work, this no longer becomes a Health & Safety work refusal and you will be subject to the company's policies that address these actions.

1.11.2.3 Managers Are Required To

- 1) Provide a written report of work refusals which contains a minimum of
 - a) Reason for work refusal
 - b) Other background information made by the employee to management in regards to the hazard and responses to the concern.
 - c) Employees involved in resolving the work refusal.
 - d) Resolutions, time frame and person responsible for implementing corrective actions.

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- e) Reason resolution could not be reached. The Ministry of Labour's orders, tasking assigned to employee if work refusal goes to a stage two.
- 2) Report work refusal to the EHS Manager, providing the above information.
- 3) Participate in investigations.

1.11.2.4 Health & Safety Manager Is Required To

- 1) Participate in the investigation to determine type and level of hazard, appropriate corrective action and time frame for implementation.
- 2) Advise employee to return to work if it is determined that a dangerous circumstance warranting a work refusal does not exist.
- 3) Participate and provide assistance in the MOL's investigation.
- 4) Review work refusal report and follow-up to ensure corrective actions are implemented.
- 5) Obtain a copy of MOL's report and employer's report of work refusal.

1.12 Workers' Safety & Insurance Board Claims Management (WSIB)

1.12.1 Intended Use Or Application

To ensure proper reporting with early intervention so that benefits will be covered within a timely fashion, as well as providing an early return to work program.

Whenever there is a reported accident, it will be reviewed, investigated, monitored and the information forwarded to Workers' Safety & Insurance Board (WSIB), if required.

1.12.2 Other

Claim procedures are divided into three sections:

- 1) First Aid, treatment can take place at the workplace.
- 2) Health Care, no lost time but visited the doctor.
- 3) Lost Time, disability beyond the first day of the accident.

1.12.3 Employees Are Required To

- 1) Report any incident/accident immediately to your supervisor and/or to the Health & Safety Manager.
- 2) Complete a Workers' Safety & Insurance Board Form 6 and submit this information to WSIB if medical attention is required.
- 3) Obtain information from the doctor to indicate regular or modified duties, if restrictions are required.
- 4) Coordinate with management in regards to a return to suitable work, as soon as possible.

1.12.3.1 Managers Are Required To

- 1) Record the incident/accident and report to the Health & Safety Manager immediately.
- 2) Complete a Manager/Supervisor Investigation Report, Schedule "B", for all injuries/accidents and after investigating the incident, send a copy to the EHS Manager.
- 3) Be in contact with the employee if there is lost time from work.
- 4) Work with the EHS Manager and the employee in identifying suitable return to work, should it be required.
- 5) Inform the employee if there is modified work available.

1.12.3.2 Health & Safety Manager Is Required To

- 1) Complete a Workers' Safety & Insurance Board (WSIB) accident Form 7 if the employee received medical attention and send this to the Compensation Board within 3 working days. Retain a copy for company files.
- 2) Ensure the manager/supervisor completes an investigation form.
- 3) Give the employee the Workers' SIB Form 6 to complete if the employee received medical attention.
- 4) Correspond or converse with the doctor, should additional information be required.
- 5) Converse with the manager and the employee about available modified work and a return to work as soon as possible.
- 6) Prepare accident frequency/severity monthly and send a report to all personnel via e-mail for safety awareness.
- 7) Monitor claims costs and verify the injuries as indicated on the monthly Cost statements and quarterly Neer statements.

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- 8) Report and investigate all accident claims including occupational illnesses, as prescribed by the law.
- 9) Ensure that a Workers' Compensation Poster, #82, is located on the bulletin boards.

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1.12.4 Schedule "A" – 6.23 – Worker's Safety & Insurance Board and/or Employee

Date: _____ Time: _____
Talked to: _____ Telephone No: _____
Employees Name: _____ Claim #: _____
Details of Conservation: _____

Progress Report:

Signature: _____ Date: _____

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1.12.5 Schedule "B" – 6.23 – Manager/Supervisor Investigation Report

☐ 1. Property Damage ☐ 2. Potential Incident ☐ 3. Injury/Pain ☐ First Aid ☐ Medical Aid ☐ Lost Time

This form must be completed & submitted to EHS within 24 hours of notification of the incident.

Basic		
Division:	Dept. Name:	Supervisor:
Employee Name:		
Occupation:	Time on Job:	
Date of Occurrence:	Time:	
Date Reported:	Time:	
Location in Plant:		
Injury		
Describe injury, part of the body, left or right side.		
Name & Address of Attending Physician		
Has employee had a similar disability? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Property Damage		
Property Loss:		
Nature of Loss:		
Estimated Costs:		
Actual Costs:		

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Severity																				
Loss Potential <input type="checkbox"/> Bodily <input type="checkbox"/> Major <input type="checkbox"/> Serious <input type="checkbox"/> Minor <input type="checkbox"/> Property <input type="checkbox"/> Major <input type="checkbox"/> Serious <input type="checkbox"/> Minor	Date of last similar Occurrence in the Dept.	Potential Frequency of Situation <input type="checkbox"/> Frequent <input type="checkbox"/> Occasional <input type="checkbox"/> Rare																		
Observation & Interview Descriptions																				
Description of tasks being performed at the time and how they resulted in incident:																				
Equipment/material (i.e.; dimensions weight etc.)																				
Person in control of incident:																				
Name of witness or persons having knowledge of the incident:																				
Check physical demands of tasks being performed at time of incident: <table border="0"><tr><td><input type="checkbox"/> sitting</td><td><input type="checkbox"/> climbing</td><td><input type="checkbox"/> twisting</td><td><input type="checkbox"/> lifting weight _____kgs.</td></tr><tr><td><input type="checkbox"/> standing</td><td><input type="checkbox"/> bending</td><td><input type="checkbox"/> reaching above shoulder</td><td><input type="checkbox"/> floor to knuckle</td></tr><tr><td><input type="checkbox"/> walking</td><td><input type="checkbox"/> kneeling</td><td><input type="checkbox"/> reaching below shoulder</td><td><input type="checkbox"/> knuckle to shoulder</td></tr><tr><td><input type="checkbox"/> running</td><td><input type="checkbox"/> crouching</td><td><input type="checkbox"/> pushing/pulling</td><td><input type="checkbox"/> above shoulder</td></tr></table>			<input type="checkbox"/> sitting	<input type="checkbox"/> climbing	<input type="checkbox"/> twisting	<input type="checkbox"/> lifting weight _____kgs.	<input type="checkbox"/> standing	<input type="checkbox"/> bending	<input type="checkbox"/> reaching above shoulder	<input type="checkbox"/> floor to knuckle	<input type="checkbox"/> walking	<input type="checkbox"/> kneeling	<input type="checkbox"/> reaching below shoulder	<input type="checkbox"/> knuckle to shoulder	<input type="checkbox"/> running	<input type="checkbox"/> crouching	<input type="checkbox"/> pushing/pulling	<input type="checkbox"/> above shoulder		
<input type="checkbox"/> sitting	<input type="checkbox"/> climbing	<input type="checkbox"/> twisting	<input type="checkbox"/> lifting weight _____kgs.																	
<input type="checkbox"/> standing	<input type="checkbox"/> bending	<input type="checkbox"/> reaching above shoulder	<input type="checkbox"/> floor to knuckle																	
<input type="checkbox"/> walking	<input type="checkbox"/> kneeling	<input type="checkbox"/> reaching below shoulder	<input type="checkbox"/> knuckle to shoulder																	
<input type="checkbox"/> running	<input type="checkbox"/> crouching	<input type="checkbox"/> pushing/pulling	<input type="checkbox"/> above shoulder																	
Cause: Analyze the situation																				
What conditions contributed to the incident (x) <table border="0"><tr><td><input type="checkbox"/> operating without authority</td><td><input type="checkbox"/> wheeled equipment operation</td></tr><tr><td><input type="checkbox"/> failure to secure or warn</td><td><input type="checkbox"/> not guarded or improperly guarded</td></tr><tr><td><input type="checkbox"/> working at unsafe speed</td><td><input type="checkbox"/> inadequate illumination</td></tr><tr><td><input type="checkbox"/> unsafe equipment</td><td><input type="checkbox"/> fire, explosion, atmospheric hazard</td></tr><tr><td><input type="checkbox"/> unsafe loading, placing, mixing, etc.</td><td><input type="checkbox"/> hazardous personal attire</td></tr><tr><td><input type="checkbox"/> unsafe position or posture</td><td><input type="checkbox"/> unsafe design or arrangement</td></tr><tr><td><input type="checkbox"/> working on moving or dangerous equipment</td><td><input type="checkbox"/> hazardous method or procedure</td></tr><tr><td><input type="checkbox"/> distracting, teasing, wilful misconduct</td><td><input type="checkbox"/> outside hazardous condition</td></tr><tr><td><input type="checkbox"/> failure to use personal protective devices</td><td><input type="checkbox"/> other (explain)</td></tr></table>			<input type="checkbox"/> operating without authority	<input type="checkbox"/> wheeled equipment operation	<input type="checkbox"/> failure to secure or warn	<input type="checkbox"/> not guarded or improperly guarded	<input type="checkbox"/> working at unsafe speed	<input type="checkbox"/> inadequate illumination	<input type="checkbox"/> unsafe equipment	<input type="checkbox"/> fire, explosion, atmospheric hazard	<input type="checkbox"/> unsafe loading, placing, mixing, etc.	<input type="checkbox"/> hazardous personal attire	<input type="checkbox"/> unsafe position or posture	<input type="checkbox"/> unsafe design or arrangement	<input type="checkbox"/> working on moving or dangerous equipment	<input type="checkbox"/> hazardous method or procedure	<input type="checkbox"/> distracting, teasing, wilful misconduct	<input type="checkbox"/> outside hazardous condition	<input type="checkbox"/> failure to use personal protective devices	<input type="checkbox"/> other (explain)
<input type="checkbox"/> operating without authority	<input type="checkbox"/> wheeled equipment operation																			
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<input type="checkbox"/> working on moving or dangerous equipment	<input type="checkbox"/> hazardous method or procedure																			
<input type="checkbox"/> distracting, teasing, wilful misconduct	<input type="checkbox"/> outside hazardous condition																			
<input type="checkbox"/> failure to use personal protective devices	<input type="checkbox"/> other (explain)																			

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Explanation of causes:			
Factors: Factors Present (in the body region where injury/other occurred)			
Posture	Time	Force	Environment
<input type="checkbox"/> poor	<input type="checkbox"/> high repetitions	<input type="checkbox"/> low	<input type="checkbox"/> cold temperatures
<input type="checkbox"/> constrained	<input type="checkbox"/> static postures	<input type="checkbox"/> moderate/high	<input type="checkbox"/> vibrations
		<input type="checkbox"/> local stresses	<input type="checkbox"/> noise
			<input type="checkbox"/> poor lightning
			<input type="checkbox"/> chemicals
Prevention: List actions that will be done to prevent recurrence. You are responsible for notifying those delegated to implement and for follow-up.			
Mark with an (x) those actions taken to prevent recurrence. More than one may apply.			
<input type="checkbox"/> reinstruction of person involved		<input type="checkbox"/> installation of guard or safety device	
<input type="checkbox"/> reassignment of person		<input type="checkbox"/> actions to improve design/procedure	
<input type="checkbox"/> order job safety analysis done		<input type="checkbox"/> check with manufacturer	
<input type="checkbox"/> improved personal protective equipment		<input type="checkbox"/> inform all department supervision	
<input type="checkbox"/> action to improve inspection		<input type="checkbox"/> discipline of persons involved	
<input type="checkbox"/> equipment repair or replacement		<input type="checkbox"/> other (explain)	
<input type="checkbox"/> correction of congested area			
Corrective Action	Delegated to Implement	Target Date	Actual Completion Date

I, the undersigned, have discussed/reviewed all aspects of this form with the employee(s) involved.

Investigated by

Signature:

Date:

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2 Emergency Response

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2.1 Emergency Response Team ERT

2.1.1 Intended Use Or Application

To respond to any emergency situation and also be able to contain any spill as quickly as possible, or a release of any uncontrollable substance into the natural environment and taking into consideration the necessary precautions to ensure that lives, Safety and Health are not at risk and minimize the loss of property or product.

2.1.2 Work Steps

Before any clean-up of hazardous products, please refer to the MSDSs which are located in the following areas:

- Plastic Lab
- First Aid Room
- Shipping & Receiving
- South Security
- EHS book shelf (HR)
- Materials Lab (only Lab content – Materials Lab only has MSDSs pertaining to chemicals used in that lab)

2.1.2.1 The Emergency Response Team is required to

- 1) Participate in required training, including the requirements identified in Schedule "B".
- 2) Ensure every precaution reasonable is taken, depending upon the immediate risk to lives and property.
- 3) Contact the Chief Co-ordinator and assess the area to try and identify the concern, taking into consideration your personal risk hazard. Area will be monitored until the situation is cleared.
- 4) If there is a chemical spill, ensure personnel are away from the immediate area. If it is necessary to evacuate the building then activate the pull alarm and follow emergency procedures.
- 5) Contain the spill with absorbent material and wear appropriate Personal Protective Equipment. Absorbent materials are located in the S.E. corner shipping and receiving area.
- 6) Report to the Facilities Manager/Chief Co-ordinator and Health & Safety Manager (EHS). If the situation is a chemical spill, report the approximate quantity spilled and what product, if easily identified.
- 7) Ensure the Chief Co-ordinator on the emergency team has phoned 9-911; otherwise you phone the fire department and /or ambulance, depending on the magnitude of the emergency you may phone Canutec for any chemical information- 613-996-6666.
- 8) Ensure that one ERT member is placed at the entrance of the parking lot directing the fire or emergency vehicles into the building.
- 9) Provide vital information to fire fighters i.e. master keys, service rooms, position of handicapped persons, hazardous areas, etc. as required.
- 10) If there is a spill, contain the spill with absorbent material but allow the qualified fire department and its special unit to clean up the spill.
- 11) Ensure first aid is provided in the event of a personal injury.
- 12) Upon receiving approval from the fire department, notify the Fire Wardens in an evacuation situation, that all personnel may re-enter the facility.
- 13) Arrange for clean-up based on MSDS procedure and disposal instruction.

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14) Report the spill and its details immediately to the EHS Manager.

2.1.2.2 Health & Safety Manager Is Required To:

- 1) Schedule proper and sufficient training for the ERT and ensure they understand the equipment and the procedures. See schedule "B".
- 2) Assist the Emergency Response Team in an emergency situation.
- 3) Document the in-house spill and if required, EHS Manager will notify the Ministry of Environment.
- 4) Notify our neighbour's, should a spill escape into the environment.
- 5) Arrange for on-going training to ensure competency.
- 6) Ensure appropriate spill response material is purchased and sufficient product is on hand.



2.1.3 Schedule "A" – 6.37 – Emergency Response Team (ERT) Members

Emergency Response Team (ERT) Members
--

Emergency Telephone Number: 9 - 911

To open the maglock doors, to allow the emergency services in, activate the fire alarm pull stations. Any alarms, will prompt the security alarm monitoring station to notify the Facilities Department.

Building/Facility Security Guards Securitas Ltd	Onsite security officer at MDA (business hours): 905-790-2800 EXT 4810 Telephone (business after hours) Dispatch: 416-489-2241 Communication centre: 416-774-2525
Fire Safety Coordinator Catherine Galvao Alternate Dominic Macchia	Telephone (business) 905-790-2800 EXT 4191 Cell: 416-455-4400 Telephone (business) 905-790-2800 EXT 4477 Cell: 416-737-2846
ERT Facilities Members:	
Ian Gibson Kin Kay Choi	Extension: 4823 Pager (in house) 6556 Extension: 4214 Pager (in house) 6527
Facilities HOTLINE (business hours): 4180	
Corporate Security Officer: Jeannie Tomlinson Alternate Wendy Hayward	Business: 905-790-2800 EXT 4417 Business: 905-790-2800 EXT 4472
ERT Volunteer Worker Members (during business hours):	
Tom Bunting (First Aid, AED, Fire Warden) Sebastian Selvagio (Fire Warden) Rick Moynihan (First Aid, Fire Warden) Traci Taggart (First Aid) Gary Searle (First Aid)	EXT: 4189 Cell: 416-629-4764 EXT: 4267 Cell: 416-906-6488 EXT: 4156 Machine Shop EXT:4875 EXT: 4991 EXT: 4175 Cell: 416-738-8045

LEAVE THE BUILDING IMMEDIATELY AT THE SOUND OF THE ALARM.

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2.1.4 Schedule "B" – 6.37 – Emergency Response Team (ERT)

Purpose: To respond to any emergency situation- medical, fire, unusual odours, explosion, spill, bomb threat, kidnap, tornado, flood, earthquake, building collapse etc. that may endanger life, the environment, or cause property damage.

Chief Co-ordinator: Don Lyons (Ext: 4669) Cell: 416-554-8720

The ERT consists of members located throughout the building. If an area is hit with a disaster, team members will respond and assist in dealing with the situation. ERT members list is posted on the bulletin boards of the facility.

Walkie Talkie's to be left on channel # 2

MSDS Binders are located:

- Plastic Lab
- Shipping /Receiving
- EHS Book Shelf
- South Security
- Materials Lab (only Lab content – Materials Lab only has MSDS's pertaining to chemicals used in that lab)

The ERT Members Must Be Fully Knowledgeable of:

- 1) The use of personal protective equipment and its availability.
- 2) The locations of the (MSDS) Material Safety Data Sheets.
- 3) How to extract required information from and read a MSDS to obtain info on personal protective equipment, fire hazards, clean-up techniques etc.
- 4) The use of a fire extinguisher.
- 5) How to operate and apply oxygen. (3 units throughout the building)
- 6) Trained in First Aid and CPR.
- 7) All the fire exit routes and assembly areas.
- 8) The reporting criteria and follow procedures.
- 9) The Fire routes and assembly areas.

2.1.4.1 Fire

Remember the main focus is to get people out of the building as quickly as possible. If the fire can be put out with an extinguisher, do it. But also phone 9-911

- Verify with security or reception that the fire department has been called, if in doubt phone 9-911.
- Investigate the cause of the alarm.
- Be at the road and entrance to the building to direct the emergency vehicles, fire truck etc.
- Inform the fire department of the emergency situation, location and coordinate the efforts of Security.
- Provide access and vital information to fire fighters i.e. master keys, service rooms, position of handicapped person, hazardous areas etc.
- After receiving approval from the fire department, or ERT Member, personnel may re-enter the building.

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2.1.4.2 Bomb Threat

Bomb notification usually comes by Telephone. If you receive the call.....Be calm and courteous, do not interrupt the caller, and obtain as much information as you can. Notify the Chief Co-ordinator while the caller is still on the phone. For Telephone tracing purposes.....Ask questions of where is it. What does it look like? Where are you calling from? Why did you place the bomb? What is your name? Try to identify characteristics of the caller such as gender, voice tone, speech, mannerisms, etc. Search your area to see if there are any strange or misplaced objects. Do not touch any strange objects. **Remember the main focus is to get out of the building.**

2.1.4.3 Explosion

If you are in the area of an explosion, throw yourself to the ground/floor, find yourself a shelter from fragments and flying objects, hide your face and your head with your arms.

If possible, sound the alarm and inform the Chief Co-ordinator. Find the nearest safest exit and leave the building. Remain in the parking lot, away from the building until further instructions.

2.1.4.4 Spill or Release of Gas or Toxic Vapours

Remember gasses are toxic and powerful.

Notify the Chief Co-ordinator immediately. If unable to reach, notify the Health & Safety Manager.

- Pull the alarm if you feel it is necessary to evacuate the building.
- Call 9-911 and give them as much info as you know.
- Area will be monitored until the situation is clear.
- Leave the building as soon as possible, and remain away from the building.

A spill is a release of any substance into the natural environment.

In the event of a hazardous spill:

- Evacuate personnel from the immediate area of the spill.
- Immediately inform the Chief Co-ordinator, EHS Manager of the area to what was spilled, where, and approximately how much.
- Isolate the area until the ERT arrives. Ensure every safety precaution.
- Identify the chemical and consult the MSDS. Refer to MDA's spill procedure and personal protective equipment.
- Some ERT members and /or first aiders should be on standby in the event of personal injuries.
- Wear appropriate personal protective equipment as per MSDS.
- Dyke the spill with absorbent material. (Supply kept in the Shipping/Receiving area both inside the hazard room and outside on the shelf.

Spills posing a threat to outside public, to the Environment or too large to be handled by MDA Employees.

- Contact ERT Chief Co-ordinator and EHS Manager.
- Phone Fire Department at 9-911.
- Canutec has info on any chemicals. Tel 613-996-6666
- EHS will report the spill to the Ministry of Environment.
- Absorbent material to contain the spill is available in the shipping/receiving area.

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2.1.4.5 Power Failure

Stay at your work station until given direction by the Chief Co-ordinator or ERT member. Turn off any machine you have used, so as to avoid a power surge when the hydro returns.

2.2 Fire and Emergency Evacuation Plan

The information in the Fire Safety Plan information is for Building Owners, Property Managers and other persons controlling properties.

Because the Fire Safety Plan has to be reviewed every year by the Municipal Fire Department, **the plan has been removed from the H&S Manual and is posted as separate document.**

The Ontario Fire Code, Section 2.8 requires the establishment and implementation of a Fire Safety Plan for every building containing a Group (A) or (B) occupancy and to every building required by the Building Code to have a Fire Alarm System.

The Fire Marshals Act states that “every person who contravenes any provision of the Fire Code and every Director or Manager of a Corporation who knowingly concurs in such contravention is guilty of an offense. One conviction is liable to a fine of not more than \$25,000 or to imprisonment for a term or not more than one year, or to both”.

This Plan is required to be acceptable to the Chief Fire Official. The implementation of a Fire Safety Plan helps to assure effective utilization of Life Safety features in a building, to protect people from fire.

Fire Safety Plans are intended to assist the owner of a building with the basic essentials for the safety of all occupants. They are also designed to ensure an orderly evacuation at the time of an emergency and to provide a maximum degree of flexibility to achieve the necessary Fire Safety for the building.

Employees must understand that whenever there is a sound of an alarm, it means to evacuate immediately.

Leave the building via the nearest exit to the designated outside area, approximately 15-20 feet away from the building in the north and south parking lots.

Once the alarm is activated, it rings through to Security Link, which automatically notifies the fire department.

The Emergency Response Team (ERT) equipped with walkie talkies, may also notify the fire department, to ensure a rapid response and monitors the situation until the fire department arrives.

Fire Wardens and Assistant Fire Wardens are assigned to an area within the building, to perform the responsibility of a safe evacuation as outlined in the Warden's section. Map outlining the areas of Warden's responsibilities, labelled A through Q1.

Emergency Response Team is trained to respond to emergency spill situations, or any emergencies, and has additional responsibilities when an alarm is sounded. **Always dial 9 prior to making external call: 9 – 9 1 1.**



2.3 Fire Warden and Assistant Fire Warden

2.3.1 Intended Use Or Application

To prepare for appropriate action during a fire or other emergency and to ensure employees leave the building, as quickly as possible, when an alarm sounds.

2.3.2 Work Steps

All emergency vehicles are to use the south entrance of the building by the security guard, unless otherwise instructed.

There are two fire rated hazardous rooms located southeast of the shipping area. These rooms contain hazardous chemicals and flammable toxic liquids.

There is an Emergency Red Button in the First Aid Room and in the Fitness Room to be pressed inward should anyone need immediate assistance. This alarm sounds as a chime in the Atrium, Human Resources and at Security.

Should there be a chemical spill, notify the Emergency Response Team (ERT) stated herein.

2.3.2.1 Employees Are Required To

- 1) Familiarise yourself with the fire alarm and emergency exit.
- 2) If you become aware of a fire in your area, and the alarm box not yet sounded, pull the alarm located in your area.
- 3) Dial 9-911 and tell the emergency service who you are, what company you are with. Keep in mind that emergency vehicles have been instructed to come to the south entrance of the building, by the security entrance, unless you specify otherwise.
- 4) Notify Carol Jackson, Security Guard, of the fire, or emergency and its location. Ext 4810
- 5) Shut off fume hoods, if you are working in any Lab areas.
- 6) Close any overhead doors, should you be in the vicinity.
- 7) Assist in helping any handicapped person, if required, and if a Fire Warden is not immediately available. Only the south elevator by the atrium is generated should there be a power failure.

2.3.2.2 Fire Wardens Are Required To

- 1) Attend training and review meetings at least once a year.
- 2) Become familiar with your responsibilities and carry them out to the best of your ability.
- 3) Wear your Fire Warden vest, if possible, when an alarm sounds.
- 4) At the sound of the alarm, sweep your designated area, to ensure the employees heard the alarm and that they are leaving the building. The alarm is difficult to hear in some meeting rooms, labs and washrooms.
- 5) Notify your assistant fire warden if you plan to be out of the building.
- 6) Shut off fume hoods in Labs and close any overhead doors, if that is your area.
- 7) Assist in helping handicapped personnel, if required. The south elevator by the atrium is the only emergency elevator, which will operate, should there be a power failure.
- 8) Notify your emergency coordinator, or an ERT member of any persons who have not evacuated the building or who may be injured and need assistance.

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- 9) Notify the Emergency Response Team should there be a spill of a chemical as stated herein.
- 10) Ensure the following information is posted in your area:
 - Map identifying zone boundaries, fire protection equipment and designated fire exits with alternate routes.
 - List of fire wardens and assistant fire wardens.
 - Fire warden crest.
- 11) Post your Fire Warden Crest near your work station so that employees will know that you are the warden. Have them understand that their priority is to leave the building immediately upon the sound of an alarm.
- 12) Conduct a survey of your area occasionally to ensure clear access routes to exits and also to fire hoses and extinguishers.
- 13) Re-enter the building after an alarm, only after being notified by an ERT member or the fire department.
- 14) Follow up by e-mail to the EHS Manager, any problems or concerns you may have, after an emergency alarm, and identify any needed corrective action.
- 15) Select a replacement and notify your EHS Manager, if you decide to discontinue your role as a Fire Warden.
- 16) Ensure you know your Fire Exit and alternate routes for your area.
- 17) Know where the nearest fire extinguisher is to you.
- 18) Know where to locate the (red) fire alarm box.
- 19) Know who is your First Aid and CPR person for your area.
- 20) Offer your assistance in an emergency situation, should you hear the Emergency Chime Alarm which comes from the area of the First Aid and/or Fitness Room.

2.3.2.3 Assistant Fire Wardens Are Required To

- 1) Follow the instructions above in conjunction with the Fire Warden and assist the Fire Warden in their duties.
- 2) Take the lead, should the Fire Warden not be available or out of the building.

2.3.2.4 Health & Safety Manager Is Required To

- 1) Ensure the Fire Wardens and Assistants are trained and that their duties are followed as instructed above.
- 2) Review the procedures and instructions once a year with the Fire and Assistant Wardens.
- 3) Keep an updated list of the Fire and Assistant Wardens and make any changes as may be required.
- 4) Attend to the emergency chime alarm, should it sound, and assistance is needed.

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2.4 First Aid

2.4.1 Intended Use Or Application

To help employees understand the actions to be taken in the event of an in house accident, incident or emergency situation.

2.4.2 Other

All accidents and near misses, however minor, must be reported to your manager and the EHS Manager, as soon as possible, and before the end of the working day.

First Aid Boxes are maintained regularly, at least once every three months.

First Aid Boxes are located:

- Shipping/Receiving
- Materials Lab
- Mechanical Lab (Machine Shop)
- First Aid Room
- Human Resources
- R & D Lab

Emergency Eye Wash Stations are located in the crucial areas of the building.

Emergency Shower is located in the Plastic Lab.

First Aid Room is situated off the corridor, on the south side of the building between the security office and the atrium.

First Aid Certificates are posted on the wall in the First Aid Room and are valid for three years.

CPR Refresher Course is conducted once a year.

2.4.2.1 First Aiders are required to

- 1) Take charge in an emergency situation; act in good faith.
- 2) Tell the person you are a first aider.
- 3) Get permission to give first aid before touching the casualty; if unconscious, you have implied consent.
- 4) Use reasonable skill and care, according to your level of training.
- 5) Do not leave the person once you offer your help.
- 6) Get employees permission to transport the injured person to a near-by clinic or hospital, or call an ambulance, depending on what medical attention is required.
- 7) Ensure "First Aid" information is recorded in the log book, at the first aid station and notify the EHS Manager immediately of any other situation.
- 8) Should a first aid injury become worse, the employer will provide safe and efficient transportation to the nearest medical facility.

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2.4.2.2 The Injured Employee Is Required To

- 1) Obtain first aid promptly. Have First Aider or other near-by person phone for an ambulance, if required.
- 2) Notify your manager immediately, or EHS Manager, should the manager not be available.
- 3) Report the accident accurately with all details.
- 4) Record in the Accident Log Book in the First Aid Room, any minor incident.
- 5) Complete a Workers' Safety & Insurance Board form, # 6 to record employee's accident and file with the Board.
- 6) Communicate with the manager or EHS Manager as soon as possible, and at least once or twice a week, should you be away from work, giving an updated report of your progress.
- 7) Follow the return to work accommodation program.
- 8) Report any off site work injuries, to the on-site responsible representative and your manager who will immediately report this to the EHS Manager.

2.4.2.3 Managers Are Required To

- 1) Ensure the First Aider is called immediately and the injured employee gets taken to a clinic or hospital to receive medical attention immediately, if more than a first aid treatment is necessary, the employer will provide safe and efficient transportation to the nearest medical facility.
- 2) Notify the EHS Manager as soon as possible and immediately if there is a serious or critical injury.
- 3) Conduct an on site investigation becoming thoroughly familiar with details of the incident. If the situation is life threatening, this may be done as soon as convenient, preferable with the employee and/or witnesses present.
- 4) Complete a Supervisor's report immediately and forward this report to the EHS Manager.
- 5) Communicate with the employee on a regular basis, once or twice a week, to get information on his/her progress and get the employee back to work as quickly as possible.
- 6) Keep the EHS Manager informed of the injured person's progress.
- 7) Report to the EHS Manager any incident that may cause property damage or a near miss so that the occurrence may be investigated by the appropriate people.
- 8) Ensure that contractors are familiar with the accident reporting procedures while on company property and a contact person if an incident arises.

2.4.2.4 Health & Safety Manager Is Required

- 1) Assist in accident investigations and follow-up re progress of injured employees.
- 2) Review first aid incidents at least once a year with the Health & Safety Committee so as to discuss any preventive measures.
- 3) Arrange for first aid and CPR training annually.
- 4) Ensure that the first aid boxes and first aid room are checked and stocked quarterly.

2.4.2.5 Visitors Are Required To

- 1) Report the incident or near miss immediately to the person responsible for his/her presence on site. If that person is not available, then the incident must be reported to the EHS Manager.



2.4.2.6 Contractors/Subcontractors Are Required To

- 1) Report the incident or near miss immediately to the person responsible for his/her presence on site. If that person is not available, then the incident must be reported to the EHS Manager.
- 2) Report this incident/accident to your employer, with accurate details immediately.



2.4.3 First Aid Trained Contacts 6.26

For an up-to-date list, please contact the H&S Manager.

2.5 Tornado/Hurricane Preparation Plan

2.5.1 Intended Use Or Application

To minimize property damage and any unnecessary injury to our employees and to facilitate a safe evacuation of personnel, whenever a tornado or hurricane warning has been announced. All building occupants are to prepare their work areas for possible landfall.

2.5.2 Requirements

Building Management /Facilities Manager as well as Fire Wardens, Assistants, and the Health & Safety Manager are responsible for coordinating and overseeing any preparation of a tornado or hurricane warning in their respective areas and in fulfilling the requirements of the Tornado/Hurricane Preparation Plan as detailed in the headings below to ensure the safety of all employees.

2.5.2.1 Building Management Is Required To

- 1) Co-ordinate and oversee any preparation of a tornado or hurricane warning, to ensure the safety of all employees.
- 2) Work with employees to ensure a safe evacuation plan with evacuation routes and destinations where safe shelter may be found.
- 3) Co-ordinate with the Health & Safety Manager as well as the Fire Wardens to ensure safety procedures and the safety of all employees.
- 4) Ensure that as much as possible, any electrical equipment has been disconnected.
- 5) Document any issues related to the evacuation and address these issues at a later date with the EH&S Manager, JHS Committee and the Fire Wardens.

2.5.2.2 Employees Are Required To

- 1) Familiarize yourself with this Tornado/Hurricane Plan and requirements.
- 2) Prepare a personal evacuation plan, including several evacuation routes and destinations where you may find safe shelter.
- 3) Know the Fire Warden and Assistant responsible for your area.
- 4) Unplug all electrical equipment.
- 5) Move computers and other equipment away from the window area to an inner location. (E.g. closet, conference room etc.)
- 6) Maintain corridors and aisle ways free of obstruction.
- 7) Secure all blinds to the top of the windows, so they don't become a flying hazard.
- 8) Clear off desktops and put all articles, including office equipment in drawers and cabinets where they do not become a flying hazard.
- 9) Lock all drawers and cabinets, if possible.
- 10) Turn off all lights.
- 11) Close and lock all doors.
- 12) Follow the instructions of your Fire Warden or Assistant.
- 13) Notify the Fire and Assistant Warden of your proposed area of shelter, so that a head count can be taken.

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2.5.2.3 Fire Wardens Are Required

- 1) Co-ordinate duties with the Facilities Manager to ensure the safety of all employees and prepare as much as possible in advance.
- 2) Appoint Assistant and Alternate Fire Wardens for their respective area.
- 3) Designate, in your absence, an Assistant who will act on your behalf, outlining clearly their responsibilities, duties and duration of absence.
- 4) Appoint an alternate, in the absence of an Assistant Fire Warden indicating the responsibilities, duties and duration of absence.
- 5) Coordinate with the Joint Health & Safety Committee any emergency management planning.
- 6) Be familiar with personnel in your area who may need a wheelchair or special assistance and have a plan in place.
- 7) Assist in the evacuation of personnel or handicapped persons.

2.5.2.4 Assistant Fire Wardens Are Required To

- 1) Assist the Fire Wardens in their activities and keep them apprised of the situation.
- 2) Perform the duties as outlined in Section 6.33.2.2, in the absence of the Fire Warden.
- 3) Notify the Fire Warden should you be absent for a period of time, so that an alternate may be selected.

2.5.2.5 Health & Safety Management Is Required To

- 1) Ensure the selection of the Fire Wardens and Assistants are in place and advise them of their duties and responsibilities at least annually.
- 2) Coordinate the tornado/hurricane plan with the Fire and Assistant Wardens along with the Facilities Manager and the Joint Health & Safety Committee.
- 3) Document issues identified during an evacuation, should it be necessary, and address these issues with the JHSC and Fire/Assistant Wardens.



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3 Environmental

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3.1 Air Emissions, National Pollutants

3.1.1 Intended Use Or Application

To ensure the appropriate Certificate of Approval is available and that we are in compliance with the Ministry of the Environment Regulations for fugitive emissions.

As a means of control for design requirements and permit registration prior to installation or modifications.

When we perform any work under the fumehood, we must ensure the fumes from these products do not exceed our level of permit.

If we alter an existing process which will change the physical or chemical characteristics of a product, we must obtain a permit relating to these emissions from the Ministry of the Environment.

3.1.2 Instructions

If any changes are being made to any of our fumehoods or any equipment that would affect the air emissions, then a permit is required prior to installation or modifications and the Health & Safety Manager must be notified immediately.

If any air sampling or hygiene surveys are required, make arrangements through the Health & Safety Manager.

If at any time there may be a release of uncontrolled substances, record the name of the product, the amount and IMMEDIATELY notify the Health & Safety Manager.

3.1.2.1 Managers Or Persons Responsible Are Required To:

- 1) Notify the EHS Manager should there be a requirement for change from the current method, in the physical or chemical characteristic of a process, so that a new permit may be obtained.
- 2) Follow the instructions for fumehood work as outlined by the manufacturer which is indicated on the label of the fumehood.
- 3) Ensure the emissions being released into the environment are in compliance with the Certificate of Approval.
- 4) Record and log any uncontrolled releases into the atmosphere, by product name, the quantity and notify the EHS Manager immediately.
- 5) Have an agency service the fumehoods or any equipment which might be vented outside, including furnaces, at least on an annual basis and a copy of this report given to the EHS Manager.
- 6) Immediately contact the Health & Safety Manager should an uncontrolled release of fugitive emissions escape into the atmosphere.
- 7) Notify the EHS Manager should any new process or a new product be released under the fumehood, to ensure the proper testing will be performed.
- 8) Notify the EHS Manager should any new stacks or openings in the roof are required. Paper work must first be completed before the process is started.
- 9) Do a periodic check of the hood openings and the condition of the hoods.

3.1.2.2 Health & Safety Manager Is Required To

- 1) Ensure the fumehood performance and extractions are checked on a regular basis with the velocities, volumetric flow rates and air flow patterns documented.

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- 2) Maintain a file for permits, air sampling, hygiene surveys and certificates of Air Approval.
- 3) File any maintenance and inspection records.
- 4) Ensure that permits are obtained prior to any new installations and modifications.

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3.2 Hazardous Waste Management

3.2.1 Intended Use Or Application

To provide a standard for the minimization and disposal of MDA waste products, this applies to a material when it becomes outdated, or necessary to be disposed of, or a required government regulation.

3.2.2 Work Steps

MDA has been assigned, by the Ministry of the Environment (MOE) registration numbers under Regulation 309, for certain types of liquids and hazardous wastes. MDA must renew their HWIN registration with the MOE, every year, in the beginning of February.

Facility Manager issues a purchase order and contacts a registered waste disposal company for pick up of identified products.

Under no circumstances shall any waste chemical products from employees be received for disposal under our registered waste manifest.

Liquid waste must be disposed of through a registered hazardous waste disposal company. Under no circumstances should any waste liquids be poured down sinks or drains which connect to sanitary or storm sewers. Waste containers should be labelled according to their contents.

If, for any reason, our waste changes in physical or chemical characteristics, we must re-apply to the Ministry of the Environment, to obtain a new waste stream and waste class registration number.

If any waste is generated, it must be stored in the appropriate chemical rooms in their proper containers. In no way shall any chemicals be mixed together. Give your waste products to the Facilities Manager, properly labelled so that they may be placed in the chemical rooms in their proper containers.

3.2.2.1 Manager or Designated Person(s) is required to

- 1) Ensure required employees are trained in the handling and disposal of waste products and that any necessary personal protective equipment is provided.
- 2) Notify the Facilities Manager should a waste class or a physical or chemical characteristic of a registered waste change, as the information must be reported to the MOE.
- 3) Ensure labels clearly identify the product. Obtain a label, if it is missing.
- 4) Place waste surplus and any products to be disposed of in an area to prevent confusion with new material.
- 5) Store waste inorganic chemicals, acids or other corrosive chemicals with non flammable materials.
- 6) Notify the ERT Coordinator, (Cell phone: 416-455-4400) should a spill occur of any hazardous waste products.
- 7) Complete a waste manifest prior to shipment, by the facilities Manager, with the type of waste, quantity, packaging, hazardous waste class number as applicable. One copy is to be forwarded to EHS Manager with the shipping document and waybill, or any other document and an additional copy forwarded to the Ministry of the Environment. MOE will return a copy within one (1) month of the shipment which is to be kept on file with the EHS Manager. The Facilities Manager is to keep a copy in the file.
- 8) Any waste product must be disposed of within a reasonable length of time. (at least once a year) Give your container to the Facilities Manager, properly labelled, so it may be stored in the appropriate chemical room until disposal.

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- 9) If a hazardous waste contractor is used, request a photocopy of the contractors licence to transport, dispose or store waste in the Province of Ontario.

3.2.2.2 Health & Safety Manager is required to

- 1) Be the contact person with the Ministry of the Environment or other Agencies, if necessary.
- 2) Provide assistance, if required, in the disposal of any hazardous waste material.
- 3) Forward a copy of the hazardous waste manifest to the Minister of the Environment within three days of the pick-up.

3.3 Ozone Depleting Substances

3.3.1 Intended Use Or Application

To comply with Federal and Provincial Government Legislation pertaining to ozone depleting substances.

To meet Montreal Protocol Schedule for ozone depleting substances (ODS).

3.3.2 Requirements

Alternate substitutions for solvents are required to:

- 1) meet or exceed the cleanliness required
- 2) not significantly affect the reliability of the part or assembly
- 3) be approved for use by Federal and Provincial legislation

3.3.2.1 Materials And Process Group is required to:

- 1) Review, define and categorize cleanliness requirements according to hardware end-users.
- 2) Review and select industry standard test methods to verify compliance to cleanliness requirements.
- 3) Perform a pilot field trial for one or two subcontractors to fine - tune the testing methods to establish an acceptable level of confidence.
- 4) Solicit input from subcontractors, program management and contracts regarding product reliability, liability and warranties.
- 5) Compile materials versus soils matrix. Two issues fundamentals to the selection of the cleaning solvent; material-solvent compatibility and soil removal efficacy.

We need a good idea of what materials to clean and what soils we are trying to remove. This information will be referred to as the materials versus soils matrix (MSM)

- 6) Do a literature search to determine the types of cutting fluids, lubricants and other processing aids used in the fabrication of metallic and non metallic hardware.
- 7) Design a survey questionnaire using the information obtained above to:
 - a) Gather detailed information from the top ten subcontractors and their vendors for designing tests in the evaluation of meeting cleanliness and compatibility.
 - b) Estimate the cost of modifying the cleaning process and equipment to fit the use of replacement solvents.
 - c) Gather subcontractor experience on any adverse effects cleaning process had on the service life of materials/parts.
- 8) Analyse survey questionnaire responses and construct a Materials Soils Matrix (MSM) draft.
- 9) Final MSM, iterated through technical disciplines will be used to develop test methodologies and verification methods.
- 10) Survey existing PPS's, PCR's, military, NASA, ASTM and other commercial sources for and other commercial sources for test methodologies for materials/solvent compatibility for vapour degreasing as well as for cold cleansing.
- 11) Survey Military, NASA, ASTM and other commercial sources for cleanliness verification criteria. Survey should include the correlation of the shop-floor visual inspection criteria such as white light and black light inspection, water break tests against non volatile residue testing and surface analytical techniques.
- 12) Determine test methodology and cleanliness verification procedure using the above data.

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- 13) Survey NASA, industry members and the cleaning industry for candidate solvents, their performance and pedigree.
- 14) Shortlist candidate solvents and survey government and occupational Health & Safety sources for engineering controls, (e.g. air handling, and safety gear) required for the various cleaning methods and solvents.
- 15) Determine the environmental, Health & Safety regulatory status of alternate solvents on a North American basis so as to not run into regional regulatory issues at a later date.
- 16) Perform representative cleaning tests against soils and substrates using methodologies and verification criteria developed.
- 17) Select best solvents and revise Process Control Requirements and Production Process Standards with its new replacement.

3.3.2.2 Health & Safety Manager is required to

- 1) Review and approve the chemical inventory form with the attached MSDS Sheets.
- 2) File MSDS in the appropriate department binders.
- 3) Review and approve the purchase requisition.
- 4) Provide instruction on the hazards and safe handling of any new chemical, with the intended users.
- 5) Refer to MSDS for the storage of this chemical and dispose of in a manner which is appropriately outlined on the MSDS.

3.4 Pesticides

3.4.1 Intended Use or Application

To ensure the Health & Safety of our employees and the environment.

Should a product of a hazardous pesticide nature be used by in-house employees or a contractor, these instructions must be followed.

3.4.2 Other

Our normal practise is using traps or electrical applications for pest control, from PCO (Pest Control) and sprays have not been used.

3.4.3 Instructions

If a spray of a hazardous pesticide chemical nature is to be used within our facility, it must first be reviewed with the Health & Safety Manager.

Pesticides used outside our building, or on our property, are to be in compliance with the Pesticide Act and the contractor must be notified that any such substance must not be allowed to go into the drains or sewers.

3.4.3.1 Manager in Charge is required to

- 1) Obtain a copy of the Material Safety Data Sheet (MSDS) from the contractor.
- 2) Review the MSDS with the Health & Safety Manager prior to the work being done.
- 3) Ensure the contractor has coverage with Workers' Safety & Insurance Board and/or insurance coverage.
- 4) Ensure the contractor is licensed under the Pesticide Act and Regulations.
- 5) Notify the employees if any spraying is to be done.
- 6) Notify the Emergency Response Team (ERT) the date and time of the activity so that preparation can be made in conjunction with the contractor to cover the procedures, if there was an unexpected spill.

3.4.3.2 Health & Safety Manager is required to

- 1) Review the copy of the Material Safety Data Sheet with the manager before the work is performed.
- 2) Ensure the contractor follows safe procedures and also to protect our employees from any unnecessary hazards.

3.5 Reduce, Reuse and Recycle (3R)

3.5.1 Intended Use or Application

To reduce waste through implementation of the 3Rs hierarchy of reducing, reusing and recycling In our day to day disposal of waste products. A waste audit and waste reduction work plan must be completed and updated annually.

3.5.2 Work Steps

A non-hazardous municipal waste audit is required to determine:

- 1) The amount, nature and composition of the waste generated in all functional areas of the establishment.
- 2) How the waste is produced, including relevant management policies and practices.
- 3) How the waste is managed.

3.5.3 Instructions

Objective is to first reduce. If that is not possible, then reuse. If one cannot reduce or reuse, then recycling is the final objective as indicated in the MOE, 3R Regulations.

Examples of how to improve the effectiveness of the 3-R Program may include the following:

- 1) Re use paper or other items
- 2) Increase the use of Email
- 3) Recycle Printer Cartridges
- 4) Decrease Lunch Waste
- 5) Remove your name from unnecessary Mailing Lists
- 6) Reduce the print-out of items, if it is not necessary.

Phone the Hot Line for special pick-up, and/or use identified containers for newspapers, magazines, brochures and telephone books.

3.5.3.1 Employees are required to

- 1) Sort paper or other products before disposing and put them in the appropriate disposal containers.
- 2) Dispose of any non-hazardous waste, white paper products, for recycling in the blue desk containers provided.
- 3) Reduce unnecessary paperwork or printing of copies.
- 4) Dispose of polystyrene, plastics, glass products and aluminium containers in the bins located near the cafeteria.

3.5.3.2 Facilities Manager is required to

Conduct a waste audit annually to:

- 1) meet Ministry of the Environment regulations,
- 2) identify sources of waste and monitor departmental waste,
- 3) quantify the 3Rs activities. (Reduce, Reuse and Recycle),

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- 4) identify problems with existing diversion programs,
- 5) enhance and/or expand existing 3Rs activities,

The Audit will involve the collection and sorting of all non hazardous waste generated at our facilities for one week. The following sources may be used when conducting the audit:

- 1) Storage containers to isolate, move and sort waste and recyclables.
- 2) Different colour bags, tags or labelled containers to identify wastes from various generation points.
- 3) Space for sorting wastes during the audit.
- 4) A weigh scale. Isolate waste samples, identify the types of waste, and record their weight.

A work plan will be developed, recorded and kept on file by the EHS Manager. After results are processed from the Audit, actions are implemented to address deficiencies and to further reduce waste through reducing, reusing and recycling.



4 Ergonomics

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4.1 Ergonomics

4.1.1 Intended Use or Application

To take all necessary measures to prevent or remedy any risks resulting from the arrangement of the work station and provide instruction and training if required.

When an employee feels the work area is not suitable or some feeling of pain is recognized due to tasks they may be performing.

4.1.2 Other

Available from the EHS Manager are

- 1) Computer and Desk Stretch chart.
- 2) Ergonomic tips for Computer users.
- 3) Neck, Shoulder & Arm Stretch chart.
- 4) Back Care.
- 5) Moving and Lifting Safely.
- 6) Safety Videos – numerous topics.

Risk Factors that have the potential of causing repetitive strain are:

- Awkward posture
- Excessive force
- Repetition

Additional Risk Factors that could have an influence are:

- Vibration
- Cold stress
- Lighting
- Fitness for the job

4.1.2.1 Employees are required

- 1) Work in a manner which is reasonable and if the work is repetitive then a break and stretch exercises are to be followed on a regular basis.
- 2) Notify the EHS Manager immediately if you become aware of any discomfort in your wrists, arms, neck or back while performing your daily tasks.
- 3) Notify your supervisor in the case of any perceived health condition to alert him/her that you are contacting the EHS Manager for assistance.
- 4) Use or wear any equipment provided if it has been recommended and purchased due to ergonomic findings.
- 5) Take the opportunity to vary activities, avoid adopting a static posture without a stretch or change.
- 6) Take a recommended five minute break and stretch every hour of continuous keyboarding.

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4.1.2.2 Managers are required to

- 1) Assist in the interaction of people working with machines, products, the environment and to ensure they understand the safe way to do the task in minimizing the potential of any risk hazards.
- 2) Report to the EHS Manager immediately, any employee ergonomic concerns or observations of which you are aware.

4.1.2.3 Health & Safety Manager is required to

- 1) Carry out a workstation assessment, if requested, taking into account the furniture, the working environment and the worker.
- 2) Advise employees on measures to eliminate any further risks identified as a result of assessing the work station and to determine if any modifications are required.
- 3) Notify the supervisor of any recommendations or requirements to follow.
- 4) Keep records of any problems identified and recommendations.
- 5) Provide any information, instruction or training as is necessary to ensure the Health & Safety of the worker.

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4.1.3 Schedule "A" – Musculoskeletal Signal Risk Factors Survey

Name:		Tel. Ext.:	
Department:		Supervisor:	
Date:		Conducted By:	
In Attendance With:		Work Station:	

The "Yes" box is checked if any of the listed conditions exist in your department.

Awkward Posture	Yes	No
Neck		
Twisted or bent in any direction for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Shoulders		
Slumped forward for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Back		
Twisted or bent in any direction for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Lifting heavy object every few minutes for four hours or more/day (please indicate approx. weight).	<input type="checkbox"/>	<input type="checkbox"/>
Lifting more than seven times per minute for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Kneeling or squatting for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Wrists		
Ulnar deviation (twisting the wrists toward the small finger) or radial deviation (twisting the wrist toward thumb) for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Flexion (downward) or extension (upward) movements for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Repetition		
Same motion every few seconds for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Intensive computer work, keyboard or mouse, for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Force		
Using a pinch grip for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Using a hand grip force for two hours or more/day/	<input type="checkbox"/>	<input type="checkbox"/>
Using any body part as a hammer to generate contact force for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Body contact with any hard or sharp object that presses into the skin for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Vibration		
Any contact with a vibrating surface, sitting, standing or hand held, for more than two hours/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		
Environment		
Working with insufficient lighting for the job task four hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Glare from a computer screen for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Working in excessive heat for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Working in excessive cold for two hours or more/day.	<input type="checkbox"/>	<input type="checkbox"/>
Comments:		

Other Information That Might Be Useful:

Please return to the Health & Safety Manager.

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4.2 Office Safety

4.2.1 Intended Use or Application

To ensure safe working procedures and maintain an office environment free from injuries. In all our office departments, ensure that safety awareness becomes a priority.

4.2.2 Other

Most falls are slips or trips at floor level. Falls are among the most costly of all accidents which could be caused by hidden steps, smooth surfaces, loose flooring, icy or wet spots, oil or grease spots and unsecured carpets. Employees could trip on electric chords, misplaced furniture, untidy floors, stairs, open drawers or other obstacles.

4.2.2.1 Employees are required

- 1) Ensure chords are stored away from walking paths. If chords must be in the area, securely tape them into place.
- 2) Keep drawers closed when not in use.
- 3) Limit shelves or drawers from becoming overloaded.
- 4) Notify the EHS Manager before any chemical or hazard product is brought into the building.
- 5) Request the assistance of the EHS Manager should you have a concern with your work station in regards to ergonomics.
- 6) Use any cutting device and office equipment with caution and safety concerns in mind.
- 7) Watch for hazardous walking conditions. Hang on to the stair rail when going up or down.
- 8) Use a proper ladder when reaching. Bend your knees to lift to avoid unnecessary pressure on the back.
- 9) Walk, not run, at all times.
- 10) Report any safety concerns immediately to your manager and/or EHS Manager.

4.2.2.2 Managers are required to

- 1) Conduct visual checks of their department and ensure employees work safely and adhere to safety procedures.
- 2) Notify the EHS Manager should an employee complain of pain or the set-up of the work station.
- 3) Inform employees of any known hazards when assigning tasks, so that the job may be performed safely.
- 4) Be flexible, if possible, on job design and employee rotation which could avoid any unnecessary repetitive strain.

4.2.2.3 Health & Safety Manager is required to

- 1) Conduct a workstation investigation should a manager or employee need assistance in an ergonomic set-up.
- 2) Provide information and feedback to the manager and employee, where an ergonomic assessment is required.
- 3) Purchase ergonomic equipment, should it be required and approved by the manager.
- 4) Address and have appropriate testing conducted on identified issues, such as indoor air quality, noise etc.

4.2.2.4 Joint Health & Safety Committee is required to

- 1) Perform a visual monthly inspection to ensure employee safety in the workplace.
- 2) Report any safety concerns brought forward by an employee to the Health & Safety Manager.

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5 Hazardous Materials Handling

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5.1 Chemical Use, Handling, Storage

5.1.1 Intended Use or Application

To ensure employees handling any chemical, flammable and combustible liquids, have a standard to follow, thereby reducing the risk of accidents or incidents that might result from handling these materials.

To ensure that inventory is maintained and completed once a year.

When any chemical is being used on our premises or off site, we must ensure employees understand the handling and use of the product as well as being able to identify its properties as outlined on the Material Safety Data Sheet.

5.1.2 Work Steps

Material Safety Data Sheets are located in binders in the following areas:

- Plastic Lab
- First Aid Room
- Shipping & Receiving
- South Security
- EHS book shelf
- Materials Lab (only Lab content – Materials Lab only has MSDS's pertaining to chemicals used in that lab)

These binders are updated on a regular basis with a complete review at least once a year.

Chemical Inventory is conducted and updated annually.

Some chemicals have a shelf-life and must be monitored carefully by Lab personnel.

Refrigerated Chemicals:

All existing temperature controlled products are stored in the refrigerator to extend its shelf life. These products would not become reactive should the temperature increase, because they are not in a mixed form.

5.1.3 Instructions

- 1) If a product does not have a label, do not use it, contact your manager who will request a proper label for this product.
- 2) Emergency shower is located in the Plastics Lab

Emergency Eye wash stations are located:

- Mechanical Lab # 1374
- Materials Lab
- Plastic Lab
- Outside Flammable & Non-flammable rooms (Bottles)
- Kitchen (Bottles)
- Boiler Room

- 3) Hazardous Chemical Storage Rooms are located in the south east area of the building. One of these rooms is identified as Non-flammable and the other is Flammable. You must be aware of the appropriate room in which you would store chemicals, due to its properties and the information identified on the Material Safety Data Sheets.
- 4) Oxidizers and Flammable products must NOT be stored together.
- 5) Storage areas for flammable and combustible liquids must be in line with the building Codes and Fire regulations as they pertain to the workplace. These areas must have restricted access to trained and authorized personnel only.
- 6) Any controlled product that is dispensed from a metal container must be grounded to avoid static electricity.
- 7) If a safety container is used, it must be ULC approved and not contain over 23 Litres (5 gallons) with a spring loaded lid, to avoid the escape of any vapours.
- 8) Handle empty containers of the hazardous chemicals as if they were full containers. There may be enough residues present in the container to form vapours and cause an explosion.
- 9) Dispensing flammable and combustible materials must be in an approved area. Isolated from other operations, adequate ventilation, no potential sources of ignition and be labelled with appropriate warning signs.
- 10) For temporary road transport of quantities less than 25 Litres of flammable liquids, use an approved pressure resistant and non-venting container. Transport in according to the Transportation of Dangerous Goods Regulations.
- 11) This procedure applies to flammable and combustible materials purchased in quantities less than 250 litres. It does not cover bulk storage, piping systems or specific process using flammable or combustible liquids.

5.1.3.1 Managers are required to

- 1) Advise their employees of hazardous materials and conditions to which they may be exposed.
- 2) Ensure that approved chemicals are used, identified and ordered through the purchasing department as stated herein
- 3) Use and handle chemicals in the manner in which they were purchased.
- 4) Store hazardous chemicals in the proper storage rooms which are identified for flammable or non flammable products. Oxidizers and flammable products will not be stored together.
- 5) Inspect work areas to ensure compliance and safe working procedures are followed.
- 6) Check storage areas to ensure products are labelled and stored according to MSDS requirements.
- 7) Check the conditions of the containers to ensure they are labelled and that the container is not punctured to cause a spill of the product.
- 8) Notify employees of the location of the emergency shower and eye wash stations and ensure portable eye wash stations are available with filled containers.
- 9) Review occasionally the hazardous chemicals to eliminate products we may not need on hand and also to check for substitute chemicals that might be less hazardous or less flammable.
- 10) Ensure that contractors and subcontractors are aware of the hazards of the materials required to complete the job.
- 11) Inspect storage areas on a regular basis for deficiencies. (Poor ventilation, no approved equipment, damaged drums or containers, missing labels, etc.)
- 12) Ensure that flammable and combustible liquids are stored according to the requirements of this procedure and not stored with incompatible materials.
- 13) Ensure that any hazardous products are not disposed of in the drainage system.
- 14) Hazardous waste may be placed in an appropriate container and disposed of in the controlled manner.

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5.1.3.2 Manager, Facilities is required to

- 1) Have an annual inventory completed on form HR038, in the area for which he/she is responsible and forward such information to the Environmental Health & Safety (EHS) Manager.

5.1.3.3 Employees Using Chemicals are required to

- 1) Participate in training provided to meet requirements.
- 2) Read the MSDS and label prior to using the hazardous material.
- 3) Get in touch with the Health & Safety Manager should you require additional clarification or understanding of this chemical.
- 4) Wear and use personal protective equipment and clothing for the job.
- 5) Avoid all ignition sources in areas where flammable or combustible liquids are used.
- 6) Use in well ventilated areas to maintain vapours below the required limits.
- 7) Use only approved safety cans, fire extinguishers, bonding wires and storage cabinets.
- 8) Retain only quantities of flammable and combustible liquids in the immediate work area which will be consumed in one day. Return unused products to the chemical storage rooms. Oxidizers and flammable products will not be stored together.
- 9) Keep daily record of the product and quantity used on appropriate record sheets.
- 10) Ensure that any hazardous products are not disposed of in the drainage system. Hazardous waste may be placed in an appropriate container and disposed of in the controlled manner.
- 11) Work under the fumehood, if products contain hazardous vapours and never store any products together if they are not compatible. Refer to the MSDS.

5.1.3.4 Health & Safety Manager is required to

- 1) Provide training on handling flammable and combustible materials safely.
- 2) Advise managers and employees on appropriate procedures for rectifying deficiencies.
- 3) Make recommendations for required engineering controls and personal protective equipment.
- 4) Ensure that an inventory of chemicals is conducted annually, in accordance with Form HR038.
- 5) Conduct a workplace assessment before the introduction of a product that may be classified as a designated substance.



5.1.4 Alodine and Alumiprep

We use Alodine and Alumiprep for metals being used for flight hardware. When an item has to be processed with Alodine and/or Alumiprep the following steps must take place.

Alodine and Alumiprep tanks are located in an enclosed area in the machine shop.

Alodine is 97% water mixture

Alumiprep is 50 % water mixture

- 1) Employee must wear Personal Protective Equipment. (Apron, gloves and eye wear available)
- 2) Fan must be turned on
- 3) Remove lid from the appropriate container/s
- 4) Article should be dipped in Alumiprep, if necessary
- 5) Then this is rinsed off in the sink under running water and air dry as much as possible
- 6) The article is now ready to be dipped in Alodine for 15-60 seconds
- 7) Rinse under running water
- 8) After this dipping it needs to be air dried for a few seconds.
- 9) Replace appropriate lid
- 10) Turn fan off

**** In addition, refer to control document PCR 12:01 (document can be found in Jeeves, under Profiles and Documents, search for PCR*)**

5.2 Compressed Gas/Acetylene Cylinders Storage and Use

5.2.1 Intended Use Or Application

To ensure knowledge of the properties of compressed gas relating to safe storage and use, and to fulfill legislative requirements.

5.2.2 Other

Each Compressed Air Cylinder must be marked with its identity and must be stored in a dry well-ventilated area, 20 feet from combustible materials, away from any heat or electrical wiring.

Cylinders are to be stored on the level, away from stairs and elevators, secured upright with a chain, cable or something similar. A cylinder tipping or falling could cause the cylinder to explode, which may cause injury and damage. When in storage the valves have to be closed and valve protection caps screwed down to the last thread.

30 psi. of compressed air can break the skin or enter into the tissue, causing swelling and pain. Bubbles of air can be driven into the blood vessels, which can cause serious or even fatal results. A blast of air can easily burst an eardrum or injure an eye. Do not point a compressed air hose at yourself or anyone else.

Acetylene is a cylinder of gas which contains approximately 300 cu. feet (standard cylinder) with porous filler, making it highly soluble.

Acetylene cylinders must be painted black and clearly marked in red letters.

Acetylene is flammable, unstable and can be decomposed by heat and pressure.

Acetylene is slightly lighter than air and reacts with copper and copper alloys.

Acetylene under pressure may decompose violently, therefore, it shall not be used outside the cylinder at pressures in excess of 15 psi, without special precautions.

5.2.3 Instructions

Hose for oxygen and fuel gas service, including hose to connect portable outlet to service piping, shall comply with the Compressed Gas Association, "Specification for Fitted Rubber Welding Hose-1973.

The accepted hose colour for acetylene is red and other fuel gas hoses.

Green is used for oxygen hose and black for inert-gas or air hose.

When parallel lengths of oxygen and fuel hose are taped together for convenience and to prevent tangling, not more than 100 mm (4 in.) shall be covered with tape.

Never try to fix or repair a cylinder leak, tag them as such.

Never smoke around compressed gas cylinders.

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5.2.3.1 Employee Responsible is required to

- 1) Ensure there is less than 6 (six) acetylene cylinders stored in the building, as it shall not exceed 2,000 cu. feet, unless in a room constructed of non-combustible fire resistant material of at least two-hour rating.
- 2) Have a storage area well ventilated and at least 6 feet from any combustible material or other source of heat that could cause an excessive rise in temperature, away from traffic routes and elevators.
- 3) Separate any oxygen cylinders from acetylene cylinders by a distance of 6 m (20 feet) or a non-combustible partition.
- 4) Close the valve on the cylinder and have the protection cap in place for both storage and during shipment.
- 5) Stand cylinders in an upright position with valve end up.
- 6) Secure cylinders in place with a chain/chord during storage or transportation.
- 7) Handle cylinders with care, either full or empty and protect from physical damage.
- 8) Use regulators or pressure reducing valves only for the gas for which they are intended and within the pressure range for which they are designed.
- 9) Inspect the hose frequently for leaks, burns, worn places, loose connections or other defects. When the hose shows excessive wear, it must be replaced.
- 10) Cylinders shall be inspected upon receipt and if defective, shall be tagged, placed in a safe location and the supplier notified.
- 11) Lift the cylinders in any convenient manner except magnets shall not be used.
- 12) Weld at a distance of 2m. (6 ft.) from the cylinder to avoid sparks, slag or overheating from hot material or processes.

5.2.3.2 Managers are required to

Ensure the above regulations under "Employee Responsible" are carried out and these safety practices monitored regularly.

5.2.3.3 Health & Safety Manager is required to

Monitor safe practice criteria for the storage and use of compressed gas.

5.3 Liquid Propane Gas Safe Handling

5.3.1 Intended Use Or Application

To recommend safety procedures for the handling of propane in order to avoid any serious personal injuries or property damage.

Whenever propane tanks are stored, removed from, or installed on equipment or vehicles at the workplace.

5.3.2 Other

Liquid Propane Gas (L.P.G.) is highly flammable and extremely volatile under certain conditions. It is used in industrial trucks as an efficient and economic motor fuel.

Propane comes from the production of propane and natural gas and is a member of the hydrocarbon family.

It is non-toxic but can displace air leading to dizziness, weakness and death. Always ensure adequate ventilation when using or handling propane and propane powered equipment. Propane has no odour or colour but Ethyl Mercaptan is added as an odourant which smells like rotten eggs. Propane is 1.5 times heavier than air, so it flows into ditches and settles close to the ground.

Open flames, cigarettes, matches. Light switches and other sources of ignition will ignite propane vapours.

Propane will expand 270 times its volume when it changes from a liquid to a vapour state. This rapid vapourization will cause severe frostbite if it comes in contact with your skin.

Propane containers should never be exposed to temperatures in excess of 125 deg. F. When the air temperature increases, the pressure in the propane container also increases.

Propane reacts to rubber, so it may melt or soften rubber hoses and rubber gaskets. Use approved hoses. Gloves for personal protection must be neoprene.

Tanks, hoses and connections can be checked for leaks using a soap and water solution bubble test on all joints. In freezing conditions, use an approved leak detecting solution.

Propane Cylinders are made of Aluminum and must be tested and certified every 10 years. Outdated cylinders must not be used or filled. Never use a cylinder with dents, gouges, broken valve handles, excessive rust, corrosion, damaged collars or foot rings. Never use a cylinder that is leaking.

Never use industrial cylinders for home use. They are dangerous and are not the correct application. The legal filling limit is 80% by volume. Ensure the valve is closed tight at all times.

Position the valve straight up in the 12 o'clock position when you install a cylinder. Ensure there is a protective cap on the valve so as to keep it clean and able to work.

5.3.3 Instructions

5.3.3.1 Steps for Removal of a Cylinder of L.P. Gas

- 1) Wear appropriate Personal Protective Clothing. E.g. Safety glasses, goggles or face shield and neoprene gloves, shirt with long sleeves to protect your skin.
- 2) Change cylinders outdoors or where there is sufficient ventilation.

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- 3) Close the valve of the feed line while the engine is running and allow it to run until the fuel remaining in the lines is consumed and the engine stalls. If this procedure is not followed, the propane gas in the line can cause second degree frost burns.
- 4) Disconnect the coupling on the liquid service valve.
- 5) Remove the safety bracket and retaining strap(s). Remove and transport the cylinder by hand or on an appropriate dolly or cart.
- 6) Place and secure the empty cylinder in the proper storage area.

5.3.3.2 Steps for Installing a L.P.G. Cylinder

- 1) Mount the cylinder in such a manner that the pressure relief valve is at 12 o'clock position and strap down firmly so there is no movement.
- 2) Ensure the liquid service valve is turned off and attach the coupling to the cylinder. Tighten the coupling by hand, not with tools.
- 3) Inspect cylinder for date, damage and rust corrosion.
- 4) Ensure liquid withdrawal valve washers are in place.
- 5) Connect the fuel line
- 6) Open the liquid service slowly to allow the pressures to equalize between the cylinder and the main fuel line. Opening too quickly may result in a vapour lock, which will leave you unable to start the truck.
- 7) Check for leaks with soap and water or an approved leak detector.

5.3.3.3 A Specific Area should be designated for the Storage of L.P.G. Cylinders

- 1) Storage of propane must be in an outdoor area. A "No Smoking" sign must be prominently displayed.
- 2) Storage cabinets should be located a safe distance away from doorways in a protected area away from vehicle and pedestrian traffic.
- 3) Cabinets should be on firm, level ground.
- 4) Cabinets should have a cover to protect against snow, ice and sun.
- 5) Store cylinders in a vertical position. Never store a full or empty cylinder upside down.
- 6) All valves must be tightly closed.
- 7) Lift and carry cylinders carefully or use a proper cylinder cart or dolly.

Cylinders must not be dropped, thrown, rolled or hit, as it could explode. Absolutely no smoking in the area.

5.3.3.4 Extinguishing a Fire Caused by a Propane Leak or Fire

- 1) Shut-off the main supply of propane immediately. Ventilate and evacuate the area until propane is dispersed. Never snuff out the flame if you can't shut off the supply of propane. The propane may come in contact with static electricity, sparks or open flames and explode.
- 2) Phone 9-911 and then assess the situation to ensure your safety in using a fire extinguisher.
- 3) Use a water spray to cool exposed cylinders and tanks, if sufficient water is not available to protect the container shell from weakening, the area must be evacuated.
- 4) Do not extinguish the fire unless the source of escaping propane that is feeding the fire can be shut-off.

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- 5) The fire can be extinguished with water, carbon dioxide and/or dry chemical.
- 6) If the propane has not ignited, the escaping propane liquid or vapour may be dispersed by a water spray or flooding.

Carbon monoxide is produced when there is insufficient air for propane combustion. If someone exhibits the symptoms of carbon monoxide poisoning, move the person to fresh air and get medical treatment immediately.

5.3.4 Requirements

5.3.4.1 Employee Responsible is required to

- 1) Be trained and obtain a certificate, every three years, in order to service these cylinders.
- 2) Become familiar with the instructions in this workplan and follow them closely.
- 3) Wear required personal protection to avoid propane contacting the skin as it will cause severe frostbite. Recommended neoprene gloves, long sleeve shirts and safety glasses.
- 4) Ensure that if a Fork truck is to be used and parked, that the truck will be in well-ventilated area away from any hazardous materials with the fuel supply shut off.
- 5) Turn off a Propane operated forklift if it is running in an enclosed area where the formation of carbon monoxide can occur.

5.3.4.2 Manager is required to

- 1) Become knowledgeable of the instructions for safe handling, servicing and storage of propane.
- 2) Ensure the employee working with propane has been properly trained.

5.3.4.3 Ensure these work instructions are understood and followed.

- 1) Ensure the instructions for Propane storage, servicing and handling are followed and monitored on a regular basis.
- 2) Ensure that training is provided for employees as required.



5.3.5 Schedule "A" – 6.41 – Propane Cylinder Handling Training

Propane is now included in Fork Truck Training instead of separately.

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5.4 Purchase and Receiving WHMIS Controlled Chemicals

5.4.1 Intended Use or Application

To provide a standard for controlled products, to eliminate the possibility of unauthorized controlled products being accepted onto company property, thereby reducing the risk of accidents or incidents involving chemicals.

Purchasing and receiving any controlled products, including samples. This also includes controlled products accepted via the shipping and receiving area or purchased via any credit card.

5.4.2 Other

Supplier labels or MSDS's cannot be altered. When a chemical is removed from the original container and put into another container, get a proper prepared WHMIS label from the EHS Manager.

Any concerns regarding accuracy must be directed to the EHS Manager immediately.

5.4.3 Instructions

MDA, will not purchase any products containing ozone depleting substances, including Freon.

5.4.3.1 Requisitioner is required to

- 1) For every NEW chemical ordered, a Material Safety Data Sheet (MSDS) from the Supplier, must be requested and this must be given to the Health & Safety Manager BEFORE the product comes into the building.
- 2) Complete a Purchase Requisition form for any WHMIS controlled products that had been previously ordered and check with the EHS Manager to ensure that an MSDS to cover that product is on file.
- 3) Order only quantities required to meet business needs considering disposal cost, shelf life, project duration minimum quantities.
- 4) Order quantity and size of container in accordance with Ministry of Labour's guidelines applicable to the type of storage available in the facility.
- 5) Verify that all samples obtained may be returned to the supplier if deemed unsuitable and obtain a means of disposal, before samples are acquired. Otherwise, ensure with Don Lyons that MDA is registered with MOEE to dispose of in the waste stream.
- 6) Review with EHS Manager, if you need information or recommendations on handling or storage and ensure these requirements are implemented prior to the purchase of the chemical.

5.4.3.2 Purchasing Agent is required to

- 1) Ensure that the Purchase Requisition form has a Material Safety Data Sheet number written on it, prior to being ordered to cover this product.
- 2) Check with the Health & Safety Manager for the MSDS number, so that it will meet requirements.
- 3) Recognize that any controlled products purchased from a non-Canadian source are considered imported by MDA.
- 4) Order only quantities required to meet business needs. Remember that certain products have a limited shelf life while others are only good for a certain project. Don't order in quantity to consider a price break unless a minimum order is required.
- 5) Ensure that any purchases containing any Ozone depleting substances are not purchased, including Freon.

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5.4.3.3 Receiver/Material Support Operator is required to

- 1) Receive products immediately if they are not controlled products and WHMIS labels are not then required.
- 2) Ensure purchases labelled as "Chemical" are filed in a centrally designated location and that WHMIS labels have been provided by the supplier upon delivery. If no label, then this product is not to be received.
- 3) Ensure that a WHMIS controlled product must have
 - a) the packing slip and receiving documents from the carrier is returned to purchasing to be kept on file for a period of 2 years.
 - b) the trade name and supplier name on the purchase order; packing slip and product container are identical.
 - c) WHMIS label from the supplier must be present and visible, if not, the product must not be received and the EHS Manager contacted for further direction.
 - d) obtain a new label from the EHS Manager if the original label is damaged.
 - e) containers that are not damaged.
- 4) Secure all compressed gas cylinders immediately upon receipt using a chain to keep them from falling over.
- 5) Forward any MSDS received with a shipment to the EHS Manager.
- 6) Inform Facilities when a large, bulk shipment has been received which requires transport to the appropriate chemical storage room.
- 7) Call the EMERGENCY RESPONSE TEAM CO-ORDINATOR, Catherine Galvao at extension 4191, or cell at 416-455-4400, should there be any chemical spill.

5.4.3.4 Responsible Manager is required to

- 1) Monitor any controlled products in the department. Ensure products are properly labelled and identified and ensure the chemical is used in the approved manner for which it was purchased.
- 2) Ensure that any products containing any Ozone depleting substances are not ordered or purchased.

5.4.3.5 Health & Safety Manager is required to

- 1) Review and approve the chemical inventory form for new products and give a number to the MSDS sheets.
- 2) Ensure that all MSDS's are dated within the 3 year period and filed in the departmental binders.
- 3) Obtain a new MSDS if the product mix has changed, or the product purchased from a new supplier.
- 4) Review and approve the purchase requisition form with signature.
- 5) Provide instruction on the hazards and safe handling of any new chemical, with the intended users.
- 6) Provide WHMIS labels to the Receiver/material support operator if the existing label has been damaged and not legible.
- 7) Verify that the ingredients on the MSDS are listed on the Domestic Substance List; otherwise it must be checked with the requisitioner to determine if necessary. If purchased, the ingredients must be registered with Environmental Canada.
- 8) Verify that all ingredients on the MSDS have a CSA number.
- 9) Check the MSDS on any new products to ensure disposal of the waste.



5.4.4 Schedule A – 6.30

New Chemical: <input type="checkbox"/>	Replacement Chemical: <input type="checkbox"/>	Existing MSDS#:
Basic		
Inventory:		
Date:	Completed by:	
Department:		
Supervisor:		
MSDS requested: <input type="checkbox"/> yes <input type="checkbox"/> no		
Supplier		
Purchasing:		
Chemical Name:		
Supplier Name:		
Supplier Address:		
Supplier Telephone:	Fax:	
Quantity ordered:	Approx. Monthly Consumption:	
Is this a sample: <input type="checkbox"/> yes <input type="checkbox"/> no		
Process		
Description:		
Location in Plant:		
Engineering Controls Provided: (type of ventilation):		
Personal Protective equipment recommended:		
Describe how chemical is used/applied:		
Disposal		
Disposal NOT Required: <input type="checkbox"/> chemical totally consumed (i.e. Paint)		
Disposal Required: <input type="checkbox"/> will be contaminated with (i.e. Oils)		
Shelf Life:		
Cost of Disposal:		
Approval		
To be completed by the Health & Safety Manager.		
WHMIS Controlled: <input type="checkbox"/> yes <input type="checkbox"/> no		
WHMIS Class:		
Disposal Class:		
EHS Manager		Date
Return this form, MSDS and Purchase Requisition to the EHS Manager.		

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5.5 Safe Handling of Liquid Nitrogen and Nitrogen Gas

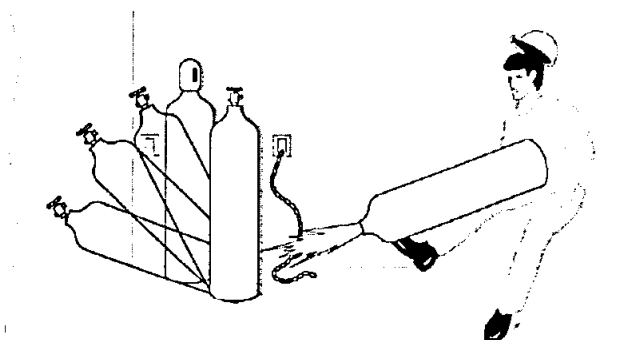
5.5.1 Safety Precautions for Handling Liquid Nitrogen (LN₂)

Precautions for handling liquid nitrogen include:

- Always wear a full-face shield, impervious gloves and proper protective clothing (lab coat, safety shoes, long sleeve cuff-less pants).
- Remove metallic jewellery/watches on hands and wrists.
- Use cryogenics only in approved containers that are capable of withstanding the extreme cold without becoming brittle such as a Dewar.
 - When dispensing liquid nitrogen, ensure WHMIS labels are applied to indicate the container has liquid nitrogen.
- Use and store in well ventilated areas with oxygen monitor surveillance for continuance of normal operations.
- Properly label cryogenic material.
- Do not ingest or allow skin contact. Never use hot water to treat a cryogen burn.
- Keep reactive cryogenics away from elevated temperatures, sparks and flames – may cause the sudden release of hazardous gas.
- Slowly immerse objects to be cooled into the coolant. This prevents rapid boiling that could splash cooling liquid out of the vessel.
- Never use liquid nitrogen or liquid air to cool substances that are combustible in air due to the risk of explosion from condensation of the oxygen in air.
- Keep cryogenic substances in containers that are not tightly closed to prevent the explosive build-up of pressure.

5.5.2 Safety Precautions for Handling Nitrogen Gas (N₂)

- Nitrogen gas is non-toxic at normal temperature and pressure; however compressed nitrogen can become a simple asphyxiant. Hence when using nitrogen gas, an oxygen monitor must be used.
- When storing cylinders, secure them to a wall or vertical support by means of restraining straps or chains.
- When moving cylinders, use a cylinder cart with a chain restraint in place. Do not drag cylinders.
- When transporting cylinders, use an open vehicle and secure them.
- Valve protection caps should be installed on cylinders at all times when not in use.



Secure and cap cylinders when not in use.

- Cylinders should never be dropped, rolled, or carried in a horizontal position as the cylinder valve may be broken off.

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5.5.3 Pressure Vessels and Transfer Systems for Cryogenics

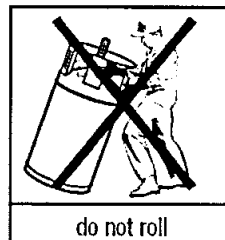
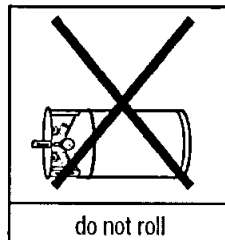
Pressurized systems involving the use of cryogenic materials may include pressurized vessels, hoses, piping, fittings and pressure relief devices. Only equipment and vessels designed for the intended product, service pressure and temperature shall be used in cryogenic transfers. Pressurized systems shall have:

- Pressurized vessels vacuum-insulated and designed in accordance with the Canadian Standards Association Boiler, Pressure Vessel and Pressure Piping Code B51. All pressurized vessels and pressure relief devices must be stamped with a Canadian Registration Number.
- Transfer hoses shall be constructed of a material that will not become brittle and weak or fracture under stress at cryogenic temperatures, e.g. flexible stainless steel.
- Closed cryogenic systems must have independent pressure relief devices for each component or segment of piping and hose that is isolated by valves.
- All piping and fittings shall be in accordance with the CSA Code B51.
- All vessels and transfer components designated for cryogenic liquids must be routinely inspected for structural integrity.

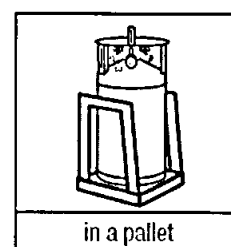
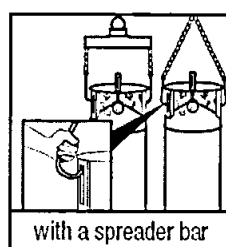
5.5.4 Loading Dock

The following procedures will be followed when signing in/out LN₂ tanks from the stores department on the loading dock:

- All workers who shall be certified as per WHMIS legislation.
- When moving the tank, do not roll the containers by holding the neck, as it is the main support for the inner vessel of the container and is susceptible to damage.



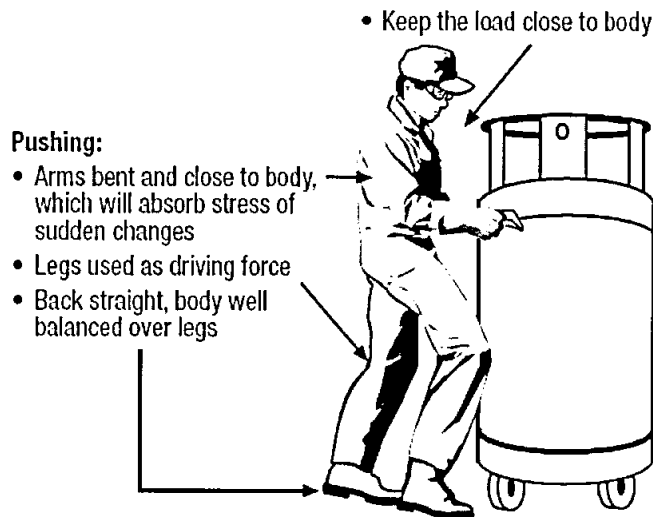
- Always use dollies for moving storage containers.



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- When moving the containers, liquid containers equipped with wheels should always be moved by pushing the container, never pulling it. This reduces the possibility of the container falling on you or a coworker, in the event it becomes unstable.



5.5.5 Training

All workers required handling, use or store LN₂ and dry nitrogen shall receive training that includes but is not limited to:

- WHMIS training and certification.
- Review MSDS for safe handling precautions for LN₂.
- Employees should understand the health and physical hazards of liquid nitrogen.
- Carry an oxygen monitor when handling and using nitrogen, to ensure acceptable levels of oxygen are maintained during normal operations.

5.5.6 Storage

LN₂ must be stored in a well ventilated area. Of particular concern are mornings because several hours will have elapsed since the room was entered, doors opened, etc. The following calculation and Table 1 give an approximate idea of the degree of danger. The important parameters are:

- Volume of the room
- Volume of LN₂ in store
- The number of air changes per hour (minimum of 0.5 per hour)
- The rate of LN₂ evaporation which is The standard equation for calculating nitrogen gas concentrations is:

$$CN = L / VR * n$$

Where CN = increase in gas concentration after a long period; L = gas release (m³/hr); VR = room volume (m³); n = air changes/hour; 1 litre of LN produces 696 litres of gas.

Table 1: Oxygen Concentration (%):Effect of Topping-up with 10 litres LN + Evaporation; 0.4 Air Changes/Hour

Room volume m3	Volume of liquid nitrogen, litres										
	10	25	50	75	100	150	200	250	300	400	500
15	18.6	18.6	18.5	18.5	18.5	18.4	18.3	18.2	18.1	18.0	17.8
25	19.6	19.5	19.5	19.5	19.5	19.4	19.4	19.3	19.3	19.2	19.1
50	20.3	20.3	20.3	20.2	20.2	20.2	20.2	20.2	20.1	20.1	20.0
75	20.5	20.5	20.5	20.5	20.5	20.5	20.4	20.4	20.4	20.4	20.3
100	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.5	20.5

- At the end of each shift and when tanks are not in use, the LN₂ tank is to be stored in the Canada Arm/Holding Bay.
- At the start of each shift, oxygen concentration measurements should be taken to ensure that acceptable levels of oxygen are in the room.

5.5.7 PPE Required

All workers when handling and using LN₂ shall wear the following personal protective equipment:

- Full Face Shield with safety glasses
- Heavy loose fitting leather or cryogenic gloves
- Long Sleeve Shirt, or Arm Protection
- Pants should be cuff-less
- Do not tuck pants into shoes, boots.

5.5.8 Emergency and First Aid Procedures

- **Oxygen monitoring alarm sounds off :**
 - Evacuate the room immediately.
 - Alert other workers in the area.
 - Contact facilities to obtain a mechanical blower for purging and ventilating the room.
 - Measure oxygen concentration.
 - Access equipment to ensure all valves and lines are connected.
- **Spills procedure**
 - The major hazard of a cryogenic liquid spill is the evaporation resulting in displacement of oxygen and asphyxiating atmospheres.
 - If there is a large spill or rupture of a container, warn others in building evacuate premises, call 911.
 - Table 2 shows the effects of LN₂ spillage on oxygen levels. For these calculations the effect of ventilation (number of air changes) was ignored. Further assumptions are that the LN₂ vaporises immediately and the released nitrogen gas mixes with the air. The figures therefore represent a pessimistic case.

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Table 2: Oxygen Concentration (%): Effect of Spillage

Room volume m3	Volume of liquid nitrogen spilled, litres						
	1	2	3	4	5	10	25
10	19.6	18.1	16.7	15.3	13.8	6.7	
25	20.4	19.9	19.3	18.7	18.1	15.3	
50	20.7	20.4	20.1	19.9	19.6	18.1	
75	20.8	20.6	20.4	20.2	20.0	19.1	16.2
100	20.9	20.7	20.6	20.4	20.3	19.6	17.4

- **First Aid Treatment Procedures:**
 - Move victim to comfortable room if possible.
 - Ensure that clothing is loose to provide unrestricted circulation. DO NOT remove clothing that is stuck to the body, until thawed thoroughly.
 - Cover affected part with bulky dry sterile dressing.
 - Send for ambulance.
 - **If liquid is splashed in the eyes, flush with water for at least 15 minutes. Seek immediate medical attention.**



5.5.9 Appendix A: Safe Handling Liquid Nitrogen and Nitrogen Gas

Liquid nitrogen is a hazardous substance. If misused it may cause, frostbite, eye damage or asphyxiation.

FOLLOW THE FOLLOWING SAFETY RULES:

Personal Protective Equipment (PPE) must be worn by all staff, who dispense or handle liquid nitrogen:

- Wear PPE (face shield, safety glasses, cryogenic gloves) when dispensing liquid nitrogen.
- Wear cryogenic gloves at all time when handling liquid nitrogen or very cold objects.
- Use only as much liquid nitrogen as needed.
- Do not allow any liquid nitrogen or cold object to touch any part of your body.
- Item in contact with liquid nitrogen becomes Extremely Cold. Do not touch any item that has been immersed in liquid nitrogen until it has warmed to room temperature.
- Store and dispense liquid nitrogen in an approved container.
- Many substances become brittle and may shatter when cold. Avoid common glass and large, solid plastics.

REPORT ANY SPILLS OR INCIDENTS TO EH&S AND YOUR IMMEDIATE SUPERVISOR.

I have read and understood this information, and have had the opportunity to have any questions answered.

Signature: _____

Printed Name: _____

Date: _____

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5.6 Thermal Chamber

5.6.1 Intended Use Or Application

To ensure the proper operation of the thermal chamber unit and to reduce any potential employee hazard.

5.6.2 Work Steps

Start-up Procedure:

- 1) Verify sufficient supply of liquid nitrogen for completion of the test.
- 2) Verify the two chambers are properly sealed inside and outside where they meet. (Tape should be applied inside and outside to maintain the seal.)
- 3) Verify all ports are adequately sealed.
- 4) Check the exhaust ducting is in good condition and not blocked.
- 5) Turn on the oxygen sensor and place beside the chamber. Keep the sensor on during the complete test.
- 6) Checks to make sure no one is in the chamber and close the door of the chamber.
- 7) Seal the door with tape and insert pin in the door latch to lock the door shut.
- 8) Check Magnehelic has the tube from the chamber connected to high pressure inlet as identified.
- 9) Before you put nitrogen into the chamber, and if you are going cold, turn on the exhaust fan and open the valve on the exhaust duct to 1/8th fully open.
- 10) Purge the chamber with gaseous nitrogen to prevent frosting. (Do not have the internal fans on during purge.)
- 11) Once the liquid nitrogen begins dumping into the chamber, turn on the internal fans numbered 1,2,3,4 and check the chamber for leaks visually and with the oxygen sensor set at 19.5.

During Thermal Testing:

- 1) Never open chamber during test, the chamber is filled with pure nitrogen.
- 2) An oxygen sensor must be on/active at all times while the nitrogen is being used. The sensor must be beside the chamber to identify any leaks.
- 3) The exhaust fan should be on at all times when there is nitrogen in the chamber.
- 4) Periodically walk around to check the chamber to ensure no leaks, as the chamber gets colder.
- 5) Verify there is no liquid nitrogen leaking out of the chamber where the two chambers meet.
- 6) The vent duct flow control valve on the wall should never be completely closed during testing when nitrogen is in the chamber. Leave approx 1/16th open.
- 7) When at cold or transitioning from cold, the chamber should always have a slightly positive pressure as indicated on the Magnehelic gauge on the side of the chamber. This is achieved by running a gaseous nitrogen purge.

Shutdown procedure:

- 1) Shut down the thermal control system on the oven. Instructions by the controls.
- 2) Close all the valves on the nitrogen tanks so that NO nitrogen will get through.
- 3) Make sure the exhaust fan is on. (Switch is on the wall beside the duct.)

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- 4) Open the duct valve to the full open position on the pipe.
- 5) Tape the check valve shut so the fan is pulling air out of the chamber.
- 6) Switch the Mahnehelic hose from High to low to ensure there is a negative pressure in the chamber.
- 7) Let the chamber evacuate for at least 10 minutes.
- 8) Remove the tape from the door and open it enough to increase the airflow. Block the door open.
- 9) Let the chamber evacuate for another 20 minutes.
- 10) Have a spotter (2nd person) watch from a distance as another slowly enters with the oxygen sensor into the chamber. If the alarm sounds, it is because of low oxygen, so leave the chamber immediately and let the chamber evacuate for another 10 minutes.
- 11) Once the chamber is open and the oxygen levels are acceptable, (anything above 19.5) shut off the exhaust fan and closes the valve on the exhaust line.

5.6.2.1 Employees Are Required To

- 1) Follow procedures as instructed above.
- 2) Ensure they are trained properly and know how to operate the equipment before using it.

5.6.2.2 Managers Are Required To

- 1) Ensure that employees are trained on the procedures and know how to operate the equipment.
- 2) Ensure that the procedures outlined above are followed.

5.6.2.3 Health & Safety Manager Is Required To

- 1) Ensure that procedures for the thermal chamber are prepared.

5.7 Workplace Hazardous Material Information System (WHMIS)

5.7.1 Intended Use Or Application

To assist employees in providing information about the protection needed to work safely with and around chemicals or any hazardous materials.

To comply with required Government Legislation, provide training, identify symbols and give information about supplier labels as well as workplace labels and cover the basic information on Material Safety Data Sheets. (MSDS)

5.7.2 Requirements

Employees have a "Right to Know" about hazards in the workplace and those hazardous products they must work with.

It is a legal requirement and responsibility of the employer to provide training for each of their employees on WHMIS, regardless even if similar training has been provided by an employee's previous employer or educational institute.

If employees handle Liquid Propane Gas, they must work within the procedures as outlined herein.

Every three years WHMIS, in one form or another, is renewed with all employees who have not had WHMIS training within the last year. A Questionnaire accompanies this program and is returned to the EHS Manager and kept on file.

Learning Outcome:

- 1) Understand what information is available and where to look for MSDS's
- 2) Understand the information provided on a MSDS label and the MSDS sheet.
- 3) Recognize hazard symbols and what they stand for.
- 4) Methods on how to control hazards.
- 5) Learning what Personal Protection Equipment to use or wear, if necessary.

Material Safety Data Sheets are kept on file at locations noted:

- Shipping/ Receiving area shelf
- Plastics Lab
- South Security (entrance, on the table) con't.....
- First Aid Room
- EHS Book Shelf (HR)
- Materials Lab (only Lab content – Materials Lab only has MSDS's pertaining to chemicals used in that lab)

A Hazardous product can be any product that can pose both Health and Physical hazards to those using or being exposed to a product.

Hazard waste cannot be disposed of in the regular garbage, follow the steps herein. The Facility Manager can assist you with waste requirements.

5.7.2.1 Employees Are Required To

- 1) Obtain their managers permission and attend the scheduled session.

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- 2) Participate in the WHMIS INFORMATION session by asking questions or raising concerns you may have.
- 3) Sign a training Activity Form with employee number so the EHS Manager and H.R. may keep a log of attendance.
- 4) Use the charge number as instructed when preparing the time card for the week.
- 5) Use the information learned in the training session to protect your health & safety and that of a co-worker.
- 6) Become familiar with the symbols, labels and refer to the Material Safety Data Sheets.
- 7) Before you use any hazardous product, check out the Material Safety Data Sheet so that you will know how to work with, handle the product as well as storage.
- 8) Wear Personal Protective Equipment, if required, PPE will be indicated on the Material Safety Data Sheet.
- 9) Obtain a Material Safety Data Sheet from the supplier and have this on file with the EHS Manager, before ANY product is brought into the building
- 10) Know what to do in case of an emergency or spill in. If the alarm sounds, then leave the building immediately to the designated area outside, away from the building.

5.7.2.2 Managers Are Required To

- 1) Ensure that each of their employees have received WHMIS training from the EHS Manager within two to three months of being hired or transferred.
- 2) Allow their employees to attend training, unless it presents a hardship, in which case the employee may attend the next session. The EHS Manager must be notified in advance should an employee not be able to attend.
- 3) Contact the EHS Manager should an employee be transferred from one department to another to review required training.
- 4) Inform employees of any known hazards in that area of which you are responsible.
- 5) Ensure that if a hazardous product is to be brought into the building or before being purchased/ordered that a copy of the MSDS has been forwarded to the EHS Manager before the product is received at MDA.
- 6) Ensure that employees wear the required Personal Protective Equipment, if necessary.
- 7) Know what to do in case of an emergency and review with your employees.

5.7.2.3 Health & Safety Manager Is Required To

- 1) Prepare WHMIS material and present training to all new employees within two to three months of commencing employment.
- 2) Maintain a record of training activities and request names with employee numbers on an Activity Form which is filed and logged into the HRIS system.
- 3) Be available to answer questions or concerns an employee may have on any of the training material.
- 4) Ensure that all employees receive some questionnaire regarding WHMIS, every three years, returned to the EHS Manager and this kept on file.
- 5) Review Emergency procedures with new hires during the WHMIS training session and review Roles and Responsibilities as outlined in the Occupational Health & Safety Act & Regulations.

5.7.2.4 Human Resources Are Required To Manager Is Required To

- 1) Provide names, date of hire or transfer, department and position title to the Health & Safety Manager. This information will be used to set up training sessions.



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6 Loss Prevention

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6.1 Accident/Incident Investigation & Reporting

6.1.1 Intended Use Or Application

To ensure prompt and accurate reporting as well as to ensure proper actions for a thorough accident investigation. To ensure there are follow-up investigation reports, upon the completion of the recommendations. To monitor claims on a daily basis to ensure the worker returns to pre-injury work as early as possible.

6.1.2 Other

MDA will conduct an investigation of any lost-time accidents, health care incidents, property damage, or occurrences that are deemed to have had the potential to result in any of the above.

MDA will provide the necessary training and facilities to ensure that investigations are carried out in accordance with the requirements of the Ministry of Labour, the Workers' Safety & Insurance Board, the best interests of the employees involved, and the prevention of similar accidents/incidents.

Investigations take place whenever workplace incidents occur:

- 1) First Aid incidents
- 2) All Lost time injuries and occupational illnesses
- 3) Medical aid incidents
- 4) Fatalities/critical injuries
- 5) Fires and explosions
- 6) Chemical spills
- 7) Property damage
- 8) Near-miss accident/incident
- 9) Workplace illness
- 10) Contractors/sub-contractors incidents
- 11) Visitors and guests on site
- 12) Spills or emissions on our property

Critical Injuries, Regulation 834, OHS Act & Regulations. Such accidents, as indicated below, must be immediately reported to the Ministry of Labour, so contact the Health & Safety Manager who will make that contact.

- 1) places life in jeopardy
- 2) produces unconsciousness
- 3) results in substantial loss of blood
- 4) involves the fracture of a leg or arm but not a finger or toe
- 5) involves the amputation of a leg, arm, hand or foot but not a finger or toe
- 6) consists of burns to a major portion of the body
- 7) causes the loss of sight in an eye.

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Should a serious or critical injury occur, the area must be immediately sectioned off, (isolated) and nothing in the area moved until an investigation is conducted.

Ministry of Labour must be notified immediately, so contact the Health & Safety Manager who will make that contact with the MOL and a written report is to follow within 48 hours.

A WSIB #7 form will be completed and sent to WSIB within 3 working days, by the Health & Safety Manager.

Should any emissions be released into the atmosphere, accidentally or not, OR hazardous spills, of any sort, contact Health & Safety Manager who will contact the Ministry of the Environment and any municipal authorities, if necessary.

6.1.2.1 Employees Are Required To

- 1) Promptly obtain first aid.
- 2) Notify your manager/supervisor immediately, or EHS Manager, should the manager not be available, with accurate details, of the injury.
- 3) Complete a Workers' Compensation Form # 6, if a lost time or medical aid incident occurs.
- 4) Communicate with your manager giving an updated progress report should you receive medical attention or loose time from work beyond the day of the injury.
- 5) Follow the return to work accommodation program stated herein.
- 6) Not be involved in any type of horseplay.

6.1.2.2 Managers Are Required To

- 1) Ensure the injured employee receives immediate assistance and/or medical attention.
- 2) Notify the EHS Manager immediately, if there has been a critical injury.
- 3) Conduct an on site investigation, becoming thoroughly familiar with details of the incident.
- 4) Complete a Supervisor's report immediately, on every incident which requires medical attention or First aid and forward this report to the EHS Manager.
- 5) Advise the employee to complete a Form # 6 and send to the Worker's Compensation Board.
- 6) Notify the EHS Manager if there have been any changes in the information previously submitted on the claim, or if any new information has been gathered.
- 7) Keep in touch with the worker who has a lost time injury, on a regular basis and inform the worker that we are able to modify the job, should there be any outlined restrictions.
- 8) Keep the EHS Manager informed of the injured person's progress.
- 9) Keep record of conversations with the injured employee by using MDA's communication recording form indicating time, date and details. (Schedule "A")

6.1.2.3 Health & Safety Manager Is Required To

- 1) Complete a WSIB Form # 7 with accurate information from the Supervisor, and send this to the Board, within three days.
- 2) Give a WSIB Form # 6 to the employee to complete.
- 3) Arrange with the worker, if there is lost time involved, a meeting at the place of employment, as soon after the accident as possible to discuss the condition of the worker and a return to work date.

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- 4) Liaise with the Workers' Safety & Insurance Board, manager and the worker on a regular basis and document all information on MDA's Communication form.
- 5) Provide information as prescribed by OHSA, on injuries, to the Joint Health & Safety Committee to review at the monthly meetings, as well as any recommendations along with the Supervisor, on how a similar incident may be avoided.
- 6) Work in conjunction with the Supervisor, doctor and employee return employee to pre-injury job as soon as possible.
- 7) Prepare a monthly report on the frequency and severity of injuries.
- 8) Complete a yearly injury analysis summary on all workplace accidents and post this information on the bulletin board.
- 9) Report any critical injuries immediately to the Ministry of Labour followed by a written report within 48 hours with detailed information. Notify the JHSC, Trade Union and Human Resources Director. WSIB must have a written report within 3 days.

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6.1.3 Schedule "A" – 6.24 – (WSIB) Worker's Compensation and/or Employee

Date: _____ Time: _____
Talked to: _____ Telephone No: _____
Employees Name: _____ Claim #: _____
Details of Conservation: _____

Progress Report:

Signature: _____ Date: _____

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6.1.4 Schedule "B" – 6.24 – Manager/Supervisor Investigation Report

- ☐ 1. Property Damage ☐ 2. Potential Incident ☐ 3. Injury/Pain
- ☐ Medical Aid
☐ Lost Time
☐ First Aid

This form must be completed & submitted to EHS within 24 hours of notification of the incident.

Basic		
Division:	Dept. Name:	Supervisor:
Employee Name:		
Occupation:	Time on Job:	
Date of Occurrence:	Time:	
Date Reported:	Time:	
Location in Plant:		
Injury		
Describe injury, part of the body, left or right side.		
Name & Address of Attending Physician		
Has employee had a similar disability? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Property Damage		
Property Loss:		
Nature of Loss:		
Estimated Costs:		

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Actual Costs:																		
Severity																		
Loss Potential <input type="checkbox"/> Bodily <input type="checkbox"/> Major <input type="checkbox"/> Serious <input type="checkbox"/> Minor <input type="checkbox"/> Property <input type="checkbox"/> Major <input type="checkbox"/> Serious <input type="checkbox"/> Minor	Date of last similar Occurrence in the Dept.	Potential Frequency of Situation <input type="checkbox"/> Frequent <input type="checkbox"/> Occasional <input type="checkbox"/> Rare																
Observation & Interview Descriptions																		
Description of tasks being performed at the time and how they resulted in incident:																		
Equipment/material (ie; dimension, weight etc.)																		
Person in control of incident:																		
Name of witness or persons having knowledge of the incident:																		
Check physical demands of tasks being performed at time of incident: <table border="0"><tr><td><input type="checkbox"/> sitting</td><td><input type="checkbox"/> climbing</td><td><input type="checkbox"/> twisting</td><td><input type="checkbox"/> lifting weight _____ Kg/lbs</td></tr><tr><td><input type="checkbox"/> standing</td><td><input type="checkbox"/> bending</td><td><input type="checkbox"/> reaching above shoulder</td><td><input type="checkbox"/> floor to knuckle</td></tr><tr><td><input type="checkbox"/> walking</td><td><input type="checkbox"/> kneeling</td><td><input type="checkbox"/> reaching below shoulder</td><td><input type="checkbox"/> knuckle to shoulder</td></tr><tr><td><input type="checkbox"/> running</td><td><input type="checkbox"/> crouching</td><td><input type="checkbox"/> pushing/pulling</td><td><input type="checkbox"/> above shoulder</td></tr></table>			<input type="checkbox"/> sitting	<input type="checkbox"/> climbing	<input type="checkbox"/> twisting	<input type="checkbox"/> lifting weight _____ Kg/lbs	<input type="checkbox"/> standing	<input type="checkbox"/> bending	<input type="checkbox"/> reaching above shoulder	<input type="checkbox"/> floor to knuckle	<input type="checkbox"/> walking	<input type="checkbox"/> kneeling	<input type="checkbox"/> reaching below shoulder	<input type="checkbox"/> knuckle to shoulder	<input type="checkbox"/> running	<input type="checkbox"/> crouching	<input type="checkbox"/> pushing/pulling	<input type="checkbox"/> above shoulder
<input type="checkbox"/> sitting	<input type="checkbox"/> climbing	<input type="checkbox"/> twisting	<input type="checkbox"/> lifting weight _____ Kg/lbs															
<input type="checkbox"/> standing	<input type="checkbox"/> bending	<input type="checkbox"/> reaching above shoulder	<input type="checkbox"/> floor to knuckle															
<input type="checkbox"/> walking	<input type="checkbox"/> kneeling	<input type="checkbox"/> reaching below shoulder	<input type="checkbox"/> knuckle to shoulder															
<input type="checkbox"/> running	<input type="checkbox"/> crouching	<input type="checkbox"/> pushing/pulling	<input type="checkbox"/> above shoulder															
Cause: Analyze the situation																		
What conditions contributed to the incident (x) <table border="0"><tr><td><input type="checkbox"/> operating without authority</td><td><input type="checkbox"/> wheeled equipment operation</td></tr><tr><td><input type="checkbox"/> failure to secure or warn</td><td><input type="checkbox"/> not guarded or improperly guarded</td></tr><tr><td><input type="checkbox"/> working at unsafe speed</td><td><input type="checkbox"/> inadequate illumination</td></tr><tr><td><input type="checkbox"/> unsafe equipment</td><td><input type="checkbox"/> fire, explosion, atmospheric hazard</td></tr><tr><td><input type="checkbox"/> unsafe loading, placing, mixing, etc.</td><td><input type="checkbox"/> hazardous personal attire</td></tr><tr><td><input type="checkbox"/> unsafe position or posture</td><td><input type="checkbox"/> unsafe design or arrangement</td></tr><tr><td><input type="checkbox"/> working on moving or dangerous equipment</td><td><input type="checkbox"/> hazardous method or procedure</td></tr><tr><td><input type="checkbox"/> distracting, teasing, wilful misconduct</td><td><input type="checkbox"/> outside hazardous condition</td></tr></table>			<input type="checkbox"/> operating without authority	<input type="checkbox"/> wheeled equipment operation	<input type="checkbox"/> failure to secure or warn	<input type="checkbox"/> not guarded or improperly guarded	<input type="checkbox"/> working at unsafe speed	<input type="checkbox"/> inadequate illumination	<input type="checkbox"/> unsafe equipment	<input type="checkbox"/> fire, explosion, atmospheric hazard	<input type="checkbox"/> unsafe loading, placing, mixing, etc.	<input type="checkbox"/> hazardous personal attire	<input type="checkbox"/> unsafe position or posture	<input type="checkbox"/> unsafe design or arrangement	<input type="checkbox"/> working on moving or dangerous equipment	<input type="checkbox"/> hazardous method or procedure	<input type="checkbox"/> distracting, teasing, wilful misconduct	<input type="checkbox"/> outside hazardous condition
<input type="checkbox"/> operating without authority	<input type="checkbox"/> wheeled equipment operation																	
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<input type="checkbox"/> working on moving or dangerous equipment	<input type="checkbox"/> hazardous method or procedure																	
<input type="checkbox"/> distracting, teasing, wilful misconduct	<input type="checkbox"/> outside hazardous condition																	

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<input type="checkbox"/> failure to use personal protective devices <input type="checkbox"/> other (explain)																	
Explanation of causes:																	
Factors: Factors Present (in the body region where injury/other occurred)																	
Posture <input type="checkbox"/> poor <input type="checkbox"/> constrained	Time <input type="checkbox"/> high repetitions <input type="checkbox"/> static postures	Force <input type="checkbox"/> low <input type="checkbox"/> moderate/high <input type="checkbox"/> local stresses	Environment <input type="checkbox"/> cold temperatures <input type="checkbox"/> vibrations <input type="checkbox"/> noise <input type="checkbox"/> poor lightning <input type="checkbox"/> chemicals														
Prevention: List actions that will be done to prevent recurrence. You are responsible for notifying those delegated to implement and for follow-up.																	
Mark with an (x) those actions taken to prevent recurrence. More than one may apply. <table style="width: 100%;"><tr><td><input type="checkbox"/> reinstruction of person involved</td><td><input type="checkbox"/> installation of guard or safety device</td></tr><tr><td><input type="checkbox"/> reassignment of person</td><td><input type="checkbox"/> actions to improve design/procedure</td></tr><tr><td><input type="checkbox"/> order job safety analysis done</td><td><input type="checkbox"/> check with manufacturer</td></tr><tr><td><input type="checkbox"/> improved personal protective equipment</td><td><input type="checkbox"/> inform all department supervision</td></tr><tr><td><input type="checkbox"/> action to improve inspection</td><td><input type="checkbox"/> discipline of persons involved</td></tr><tr><td><input type="checkbox"/> equipment repair or replacement</td><td><input type="checkbox"/> other (explain)</td></tr><tr><td><input type="checkbox"/> correction of congested area</td><td></td></tr></table>				<input type="checkbox"/> reinstruction of person involved	<input type="checkbox"/> installation of guard or safety device	<input type="checkbox"/> reassignment of person	<input type="checkbox"/> actions to improve design/procedure	<input type="checkbox"/> order job safety analysis done	<input type="checkbox"/> check with manufacturer	<input type="checkbox"/> improved personal protective equipment	<input type="checkbox"/> inform all department supervision	<input type="checkbox"/> action to improve inspection	<input type="checkbox"/> discipline of persons involved	<input type="checkbox"/> equipment repair or replacement	<input type="checkbox"/> other (explain)	<input type="checkbox"/> correction of congested area	
<input type="checkbox"/> reinstruction of person involved	<input type="checkbox"/> installation of guard or safety device																
<input type="checkbox"/> reassignment of person	<input type="checkbox"/> actions to improve design/procedure																
<input type="checkbox"/> order job safety analysis done	<input type="checkbox"/> check with manufacturer																
<input type="checkbox"/> improved personal protective equipment	<input type="checkbox"/> inform all department supervision																
<input type="checkbox"/> action to improve inspection	<input type="checkbox"/> discipline of persons involved																
<input type="checkbox"/> equipment repair or replacement	<input type="checkbox"/> other (explain)																
<input type="checkbox"/> correction of congested area																	
Corrective Action	Delegated to Implement	Target Date	Actual Completion Date														

I, the undersigned, have discussed/reviewed all aspects of this form with the employee(s) involved.

Investigated by

Signature:

Date:

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6.1.5 Schedule "C" – 6.24 – Incident Reporting

Name:

Date:

Time:

Reported:

Witness:

Manager/
Supervisor:

Incident:

Preventative
Measures:

Follow-up

Date:

EHS

Manager:

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7 Occupational Health & Safety

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PE142 Rev B (May 23, 2007)

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Company Sensitive

7.1 Electrical Safety (Lock-out)

7.1.1 Intended Use Or Application

To safely perform maintenance or service work on industrial equipment and to increase the awareness of understanding the importance and methods of controlling energy and lockout standards in order to prevent any needless or serious injuries.

Whenever service or maintenance is being performed around machines where an employee or someone else could be injured by unexpected startup of the equipment or a release of stored energy.

7.1.2 Requirements

Sources of energy:

- Electrical
- Pneumatic - air operated
- Hydraulic - fluid assisted
- Chemical & Combustion - gasoline engine
- Kinetic - motion of any object
- Mechanical

A lockout station with locks and tags/hasps is situated on the wall in the maintenance area. Locks have one key only, to ensure the proper procedures are being followed.

7.1.2.1 Employees Are Required To

- 1) To receive training prior to any lock-out procedure being implemented as stated herein
- 2) Know where the emergency stop button is located, if working on any electrical machinery and immediate disconnect of power becomes necessary before starting work.
- 3) Contact the electrician should there be a problem with any electrical source and not attempt to repair the problem.
- 4) Report to your supervisor/manager immediately, if you are aware of any frayed chords or any other electric hazards. Plug, Lockout devices are available from facilities, should you recommend that the frayed chord and plug not be used.
- 5) Wear Any Personal Protective Equipment as required.

7.1.2.2 Licensed Electrician Is Required To

- 1) Be the only person allowed to work on any electrical energy sources.
- 2) Understand the types and amounts of energy, the hazards of that energy and how it can be controlled.
- 3) Isolate all energy sources as well as any secondary power supply.
- 4) Turn off machinery before the electrical switch, under load, is pulled to the off position.
- 5) Wear Personal protective Equipment as required.
- 6) Disconnect in the proper manner, by using the off switch. Never remove a fuse to close off the power supply.
- 7) Notify the manager of any lockouts affecting their area.
- 8) Understand how the equipment operates and where the controls are situated to turn off all energy sources.

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- 9) Attach the lock and tag to ensure a proper lock-out on the disconnect switch.
- 10) Complete the information required on the tag with name, department and expected completion date or time.
- 11) Ensure that required personal protective equipment is being worn.
- 12) Use a voltmeter or other testing equipment to check the switch for power.
- 13) Press all start buttons on the machine to ensure there has been a proper disconnect before commencing any work.
- 14) Before restarting the machine check that guards are in place, if applicable. All tools used are accounted for. Everyone is clear of the equipment.
- 15) Remove his/her own lock and re-energize the system.
- 16) Ensure that if a lock has to be cut off, it must be done in the presence of the manager.
- 17) Under no circumstances, work on live electrical wires.

7.1.2.3 Contractors or Subcontractors are required to

- 1) Follow MDA's lock-out procedures when performing any electrical related work as stated herein

7.1.2.4 Managers are required to

- 1) Notify their employees of MDA's lock-out procedures and ensure they are being followed, as stated herein.
- 2) Be present, should a lock need to be removed. The employee who first put on the lock must be contacted before cutting the lock, in any emergency situation.
- 3) Ensure that any electrical work must be done by a licensed electrician or a designee.
- 4) Ensure that a First Aider & CPR Trained person is in the area.

7.1.2.5 Facility Manager is required to

- 1) Ensure as part of the maintenance schedule, that grounding faults are appropriate to all electrical equipment.

7.1.2.6 Joint Health & Safety Committee Members are required to

- 1) Check, during monthly inspections, equipment, to ensure electric chords are not frayed and that the ground tong is still intact. Notify the Supervisor immediately should you find the issue of serious nature.

7.1.2.7 Health & Safety Manager is required to

- 1) Review MDA's lock-out procedures with employees involved, upon request or as required.

7.2 Elevated Surfaces

7.2.1 Intended Use or Application

To ensure employees understand and follow the required regulations when working or climbing at heights above ground level.

When an employee uses any type of ladder or works on any elevated surface above three metres from the ground or floor position.

7.2.2 Instructions

Ladders may be portable, straight ladders, step ladders or a platform type ladder.

Ladders shall:

- 1) be free of broken or loose members or other faults.
- 2) have non-slip feet
- 3) be placed on a firm footing
- 4) Where the height of the ladder exceeds 6 meters in length and is not securely fastened, or where it may be endangered by traffic, then the ladder shall be held in place by one or more persons.
- 5) The ladder should be put up correctly, following “4 to 1” rule. One foot back for each four feet up. When setting up the ladder, count the number of rungs up to the point where the ladder touches the wall. The bottom of the ladder must be one rung’s length out from the wall for every four rungs up the wall. See figure 1.
- 6) tie the ladder at the top or bottom in order to make it more stable.

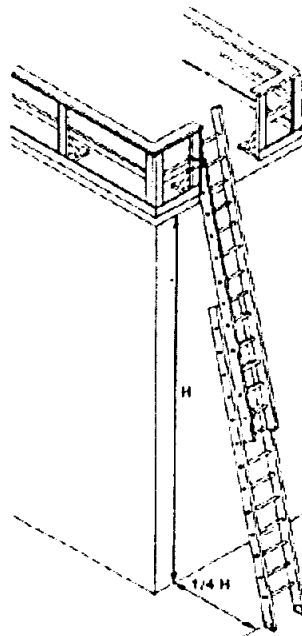


Figure 1: Properly raised ladder.

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Guardrails must be:

- 1) around the perimeter of an uncovered opening in the floor, roof or other surface to which a worker has access.
- 2) at an open side of a raised floor, mezzanine, balcony, walkway, ramp etc.
- 3) around a vat, bin, tank which is above the ground or floor surface.
- 4) around a machine, electrical installation, place or thing that is likely to endanger the safety of an employee.
- 5) of a smooth material and at least 42" high.

Fall restraint harnesses must be:

- 1) worn, when working on surfaces with a distance of 3 metres off the ground.
- 2) inspected for fraying, wear, damage and mildew before each use.
- 3) able to fasten clips securely and the clips firmly attached.
- 4) worn with a harness to keep employees from falling long distances.
- 5) worn by no more than one person at a time, if a single vertical lifeline is used.

7.2.2.1 Employees are required Managers are required to

- 1) Survey the area in which you are to work and measure the distance from the ground or floor to the height where your work is performed. If it is 3 metres off the ground, then a harness is needed. Look to see if there may be any other hazards in the area which you should be aware of, including overhead lighting, furnaces etc.
- 2) Refer to Instructions Section 7 to see if a guardrail is required.
- 3) Refer to Instructions Section 7 if a ladder is going to be used.
- 4) Refer to Instructions Section 7 for information on safety belts.
- 5) Tie the ladder at the top or bottom.
- 6) Face the ladder when ascending or descending and use both hands.
- 7) Never stand higher on the ladder than the third rung from the top.
- 8) Use a safety belt and lanyard if the working distance is 3 metres off the ground.
- 9) Report any defects in the safety equipment to your manager.
- 10) Ensure the proper personal protective equipment is worn.

7.2.2.2 Managers are required to

- 1) Ensure the employees understand the handling of ladders and safety harnesses as well as the need to inspect them before using.
- 2) Ensure that employees working on elevated surfaces understand the safety requirements.
- 3) Identify any hazards in the area where the employee is to work.
- 4) Ensure that equipment and safety devices are maintained and serviced on a regular basis.
- 5) Provide employees with any personal protective equipment that is required and ensure they are worn in the manner intended. Ensure the PPE is inspected regularly and maintained in good condition.
- 6) Ensure training is identified, if required, to the EHS Manager.

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7.2.2.3 Health & Safety Manager is required to

- 1) Assist the managers in identifying the hazards of elevated surfaces.
- 2) Provide training as identified by the managers.
- 3) Keep maintenance records on file.

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7.3 Equipment and Machinery

7.3.1 Intended Use or Application

To identify any current risks or hazards by taking steps to establish methods and processes to reduce unnecessary exposure or risk of a hazard to our employees.

When purchasing new equipment, modifying equipment, before the beginning of a new program and/or during some test stages, if required, for preventive maintenance of our equipment and safe machine operation as well as ensuring continued safety of our employees. Refer to Schedule "A" for OHSA pre-start reviews.

7.3.2 Work Steps

A Pre-start Health & Safety review must take place if any new apparatus, equipment, process, structure or protective element is to constructed, added, installed or modified.

A pre-start health & safety review includes the completion of a written report as in accordance with HR046. OHSA Pre-start Health & Safety information list, Schedule "A".

Equipment Acquisition, design and policy purchasing, MDA is committed to the protection from accidental loss of all its resources, including employees and physical assets.

It will be our policy to assure that all equipment acquired or designed, its setup and maintenance must meet all necessary safety and loss prevention criteria, legislated or otherwise.

A full time commitment by each employee is to prevent our resources from accidental loss.

When Purchasing, Installing or making modification to any equipment or machine, complete pages 1 & 2 of Hazard Identification.

7.3.2.1 Instructions

"Working alone" can be defined as having no other individual nearby or within shouting distance. Working alone is acceptable, even after hours, but you should adhere to the following safety precautions.

If you are working with or on a particular machine, know how the machine works and protect yourself from the hazards of: conveyors, saws and cutters, presses, elevators, moulding equipment, robots etc.

There could be:

- Rotating Action
- Cutting Action
- In-Running Nip Points
- Punching/Shearing or Bending Actions
- Vibration
- Electric Power
- Other Hazards including kickback, hot metal, gases, vapours, broken blades, sharp edges, rough surfaces, heat, wood chips, slivers.

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- Unexpected start-up
- If you are working alone, notify another individual in the building, if possible, and have that person check-in on you every few hours, depending on the activity and the environment.
- You must take responsibility for the safe operation of the machinery, tools and facility.
- You should be aware of telephone numbers of contacts to call, in an emergency situation.
- Wear all necessary protective gear and clothing.
- Long hair must be tied securely.
- Remove all personal accessories, such as rings, watches, jewellery etc.
- Any loose clothing must be removed and open jackets are to be fastened.
- Never leave a machine running unattended.
- Keep your hands well away from any point of contact between the workpiece and the machine.
- Ensure that you are familiar with the work to be done before you start operations and take the time to safely operate the machine or tool.
- Make sure all machine guards are in working order. Do not bypass any guard.
- Follow the lock-out procedure, when required.
- Keep the area tidy and uncluttered.
- If you feel a machine is unsafe or an instruction is unclear, talk to your manager immediately. If it is an unsafe condition in the shop, fix it first or bring it to the attention of your co-workers and manager.

7.3.2.2 Employees are required to

- 1) Ensure that the pre-start Health & Safety information, Schedule "A," has been reviewed and the EHS Manager notified before any operation begins.
- 2) Use only machines, equipment and tools you are authorized to operate.
- 3) If maintenance or repairs are required, replace all guards before putting equipment back into operation. Guards may be removed to adjust or repair the machine while it is stopped.
- 4) Use the brake on the machine or turn it off to slow down moving machinery, never use your hands or a make-shift device.
- 5) Lock-out any machine, with your own lock and tag, when cleaning, adjusting or for repair as stated herein
- 6) Know where the emergency button is situated, in case it is needed.
- 7) Comply with any safety signs posted in the area and wear personal protective clothing if required.
- 8) Identify if any machine guarding is needed and request this requirement from your manager who will verify the requirement with the EHS Manager.
- 9) Use the right tool for the job and make sure it is in good repair.
- 10) Ensure that personnel are not in the area when you turn on electricity, compressed air, or set any machinery in motion.
- 11) Use compressed air nozzles as prescribed. These are in place to reduce the pressure and must not be removed. Use compressed air wisely and for the intended use, only.
- 12) Use blanks to insert into a joint of a pipe or system, to stop any unwanted chemicals from getting through.
- 13) Have a buddy in the area, if any hazardous chemical work is to be done.
- 14) Maintain a clean and safe working area.
- 15) Check for frayed cords and ground prongs on all electrical equipment including portable electric tools.

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- 16) Drain and clean any pipelines, hydraulic or pressurized equipment before repairs.
- 17) Lower the forks to the ground when a lift truck is not in operation.

7.3.2.3 Managers are required to

- 1) Contact the EHS Manager to have completed a Pre-Start Evaluation form, HR046 before the start up of and new process, new or modified Equipment or measures.
- 2) Ensure that preventative maintenance is carried out so that machines & equipment are safe and in good working order.
- 3) Have yearly inspections on machines and equipment and maintain a log or service receipt.
- 4) Identify any known hazards and make it know to employees before the beginning of a job.
- 5) Ensure that employees receive training and become aware of any hazards.
- 6) Ensure that employees work in a safe manner and wear personal protective equipment if required.
- 7) Ensure guards are in place and used when machines are operating.
- 8) Prohibit employees from working around machinery with jewellery, long hair or loose clothing.
- 9) Take inventory of the equipment under your responsibility, identifying the machine, its location, serial number and service certificates.
- 10) Notify the EHS Manager if you have reason to believe a machine or new equipment has a high noise level so that a noise survey can be taken.
- 11) Have signs made and posted to identify any hazard or personal protective equipment required.
- 12) Cover all moving parts on equipment and machinery with guards, where there is a possibility of getting your hands caught in the gap. (pinch point)
- 13) Ensure employees follow the lock-out procedure, if required, as stated herein
- 14) Mount grinding wheels and replace grinding wheels as the manufacturer has recommended.
- 15) Ensure that compressed air is used for the intended purpose only and describe the dangers of compressed air to involved employees.

7.3.2.4 Facility Manager is required to

- 1) Ensure that preventive maintenance takes place by having all equipment, machinery, facilities, elevator, boiler, fire protection equipment, etc. serviced at least on an annual basis.
- 2) Copies of all contracts for servicing, repairs etc. are to be kept on file for record keeping.
- 3) Certificate must be posted in the boiler room, near the equipment after the annual inspection.
- 4) Prepare a record for all equipment, machines, facilities that need servicing during the year and ensure this takes place.
- 5) Retain a copy of maintenance logs, inspection reports to ensure equipment is properly maintained.

7.3.2.5 Health & Safety Manager is required to

- 1) Conduct a noise level survey of the facilities, as required, to ensure areas are identified that require ear protection.
- 2) Complete a Safety Program Evaluation Checklist, in accordance with HR046 with
- 3) The assistance of a JHSC Member, or any other required person, to ensure safety procedures are being followed.
- 4) Sign-off on HR046, and ensure if there were any deficiencies, that they have been corrected.

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7.3.3 Schedule "A" – Pre-start Health & Safety Information

Occupational Health & Safety Act & Industrial Regulations (Section 7)

Section 7:

All measures identified in the review are required for compliance with the relevant provisions of the Regulations.

The review consists of a written report, for circumstances as listed below.

Safety Program Evaluation Pre-Start Checklist

Substance that may result in exposure	Flammable liquids	Dust collector involving a risk or explosion	Aluminium or steel foundry	Safeguarding that signals A stop Guard using Mechanical or electrical devices	Articles stored on a rack or racking structure	Process involving A risk of explosion Or a risk of ignition	Construction Installation, modification relating to lifting devices, cranes
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Contact your Health & Safety Manager before the operation of any new, modified or existing measures to ensure proper reviews are being taken.

- 1) Where a new apparatus, structure or protective element is to be constructed, added or installed or a new process is to be used.
- 2) Where an existing apparatus, structure, protective element or process is to be modified, whether new or modified engineering controls, new or modified measures used or a combination of new, existing or modified engineering controls or new or modified measures.

Special Circumstances :

- Any circumstances regarding flammable liquids
- Safeguarding devices and systems or barrier guards
- Material, articles or things placed or stored on a rack or stacking structure
- A process involving a risk of ignition or explosion
- The use of a dust collector involving a risk of ignition or explosion
- A factory producing aluminium or steel
- The construction, addition, installation or modification relating to a lifting device, travelling crane or automobile hoist.
- A process using or producing a substance that may result in the exposure to a worker in excess of the exposure limits.

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7.3.4 Schedule " B " – Fork Truck Battery Maintenance

WHETHER THE BATTERY PROVIDES TRACTION OR AUXILIARY POWER, IT DEMANDS RESPECT.

BATTERIES CONTAIN ACID, WHICH BURNS. IT RELEASES HYDROGEN, WHICH EXPLODES.

IN ANY OPERATION SERVICING A BATTERY, FOLLOW THESE RULES:

- No smoking
- No open flames (use a plastic flash light if necessary)
- Keep metal objects away from the cells, including screwdrivers
- Use proper tools
- Protect your eyes
- Remove rings and bracelets
- Use personal protective equipment, gloves, faceshield and apron
- Flush acid spills or splashes with large quantities of water. Quickly remove any contaminated clothing.

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7.4 Extreme Temperatures

7.4.1 Intended Use Or Application

To ensure safe working conditions for our employees. When temperatures are above the suitability for the type of work performed, or where “hot work”, such as welding, is being performed.

7.4.2 Other

Extreme temperatures places extra physical strain on our bodies.

Overexposure to heat can cause fatigue, heat rash, fainting, muscle cramps, heat exhaustion, and heat stroke. In the US Approximately 500 people die from heat-related illnesses every year.

Hot or cold temperatures may cause:

- Physical discomfort
- Irritability and anger
- Poor judgment
- Diverted attention from the job
- Slower mental and physical reactions

7.4.2.1 Employees are required to

- 1) Use caution when working in an extreme hot or cold environment.
- 2) Get information from the manager or EHS Manager in regards to the hazards of hot or cold stressors and how to cope.
- 3) Protect skin if exposed to sun or ultraviolet light.
- 4) Dress in layers or with down filled clothing if working in a cold environment. Wear lightweight, loose-fitting, light-coloured clothing. Change your clothing if it gets completely saturated.
- 5) Use general ventilation. Good air flow increases evaporation and cooling of the skin.
- 6) Wear personal protective clothing and/or face protection, if hot work is being performed.
- 7) Notify, immediately, a First Aider, EHS Manager or manager should you encounter heat cramps, exhaustion or heat stroke.
- 8) Take regular rest breaks.
- 9) In extreme temperatures, work with a buddy.
- 10) Drink plenty of liquids in a hot environment to replace body fluids. (5 to 7 oz. of water every 15 to 20 minutes.)
- 11) Inform your supervisor about any physical condition which may increase susceptibility to heat stress.

7.4.2.2 Managers Responsible are required to

- 1) Ensure that employees are aware of the hazards working in hot, cold or in a hot work environment.
- 2) Ensure employees are aware of how to protect themselves from such temperatures.
- 3) Make available personal protective clothing, should it be required.
- 4) Provide contact names and telephone numbers in case of an emergency.

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- 5) Provide a buddy system, if the working temperature is extreme.
- 6) Ensure there are plenty of liquids for consumption, in hot environments.
- 7) Be able to detect early signs of heat-related illness and permit employees to interrupt their work if they become extremely uncomfortable.

7.4.2.3 Health & Safety Manager is required to

- 1) Provide information on extreme temperatures, should an employee or manager request it.
- 2) Ensure that selected employees are trained in First Aid and CPR.

7.5 Genie Equipment, Aerial Work

7.5.1 Intended Use or Application

To ensure safe operational practices for aerial work and to understand the safe guidelines for proper controls as well as ensure the completion of a pre-inspection check list.

7.5.2 Work Steps

- **Do not operate in windy conditions**
- **Do not operate during electrical storms**
- **Do not operate in any unsafe weather conditions**
- **Check Operator's Manual for specific information regarding this equipment**

This Genie Boom Aerial lift is a one-man self-propelled integral-frame boom supported elevating work platform which articulates, rotates, and telescopes above and beyond the base dimensions to position personnel, along with their tools and materials, at the work location. Have a maximum platform of 30 feet and a maximum reach of 20 feet from a vertical elevation of 14 feet. Power for all functions is provided by stored electrical energy. Lift mode and steering functions are operated by a hydraulic pump, powered by an electric motor to deliver fluid power to hydraulic actuators. A hand pump is also provided to operate the boom, turntable, and steering functions in the event of total power loss.

7.5.2.1 Employees are required

- 1) Receive training, oral and written instruction (manufacturer's instruction) on the use and safe operation of any aerial device, prior to operating the equipment.
- 2) Never elevate the platform with more than one person aboard.
- 3) Complete a pre-inspection form before each shift.
- 4) Report immediately to your supervisor any problems or defects and ensure this is tagged out of service until the problem is corrected.
- 5) Not exceed the platforms rated load.
- 6) Operate the equipment only on firm, level ground.
- 7) Never move the equipment with the bucket suspended, it could easily tip over. Lower it to the ground first.
- 8) Use in a manner that would not affect its stability or endanger a worker.
- 9) Wear a full body harness, used in conjunction with a lanyard and attached to the designated anchor point on the aerial lift.
- 10) Know where the Manufacturer's manual is located on the machine.
- 11) Check the last date the machine was serviced by a qualified person, which should be annually.
- 12) Ensure all ground and aerial hazards are eliminated before operating the aerial lift. Survey the area for surface hazards, holes, bumps etc.
- 13) Check for any live electrical hazards and de-energize any sources, remembering the aerial platform is not insulated. Do not operate within 10 feet of power lines.
- 14) Check weather conditions, as the unit should not be used in windy conditions or during electrical storms.
- 15) Place warning signs around the equipment, or cordon off the area, if there is any danger of being in a traffic area.
- 16) Know where the emergency back-up lowering system is located and how to get the aerial platform down.

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- 17) Ensure that the equipments limit switch will not reach beyond the highest permissible position.
- 18) Ensure that no part of the load or device passes over any worker.
- 19) Ensure that another worker or supervisor is aware of this aerial being used so that there could be communication. Have another person on the ground while you are operating the machine, in case of any emergency so that immediate contact can be made.
- 20) Remain inside the cage at all times. Do not sit, stand or climb on the guard rail or mid-rail.
- 21) Lower the mid-rail bar across the entrance after mounting the platform.
- 22) Use the equipment down any slope at walking speed, approx 3 mph.

7.5.2.2 Mangers Responsible are required to

- 1) Ensure that employees are trained and understand the hazards of the Aerial lift before operating this equipment.
- 2) Ensure that any modifications or repairs to the boom or crane shall be made in accordance with the manufacturer or a professional engineer.
- 3) Ensure that employees wear a full body harness, while operating the Genie Lift, connected to the anchor point and used with a lanyard fitted with a shock absorber.
- 4) Ensure there is adequate means of communication between the worker on the ground and the crane operator.
- 5) Ensure the worker is informed and understands adequate emergency rescue should the need arise.
- 6) Maintain permanent records of all inspections, tests, repairs modifications and maintenance performed on it.
- 7) Ensure the instructions for employees are followed as in 6.52.2.1
- 8) Service the equipment, by an outside company, annually, if the equipment is to be operated.

7.5.2.3 Health & Safety Manager is required to

- 1) Ensure that training is provided for any operator using the equipment
- 2) Maintain training records for employees.

7.5.3 Schedule "A" – 6.52 – Genie Boom Aerial Lift Pre-Operational and Operating Instructions

- 1) Visually inspect machine for any damage or missing parts.
- 2) Check that the platform is secure, with all fasteners in place.
- 3) Check hydraulic oil levels with platform fully lowered and boom completely retracted.
- 4) Check battery fluid level
- 5) Check battery terminals for tightness of connectors and cleanliness
- 6) Check battery charger to verify that output meter indicates charging current
- 7) Check tires Maintain tire pressure. Ensure lug nuts are securely tightened.
- 8) Operate machine from the ground through all functions to check the machine and controls are in safe working condition.
- 9) Complete pre-inspection list.

Operating Instructions

- 1) Turn on the machine by selecting power on mode on control console.
- 2) To de-activate lift and drive controls at the platform and set machine parking brake, close EMERGENCY STOP red toggle switch cover.
- 3) Always have another person on the ground beside you in case of emergency and also for communication purposes. This person may direct traffic around you should you be in a traffic area.

Driving Down a Ramp

- 1) Before driving down a ramp, make sure the platform is fully lowered.
- 2) Drive down ramp with platform and steering axle on uphill side of machine, for maximum control. The steeper the ramp, the less distance the machine should be allowed to coast.
- 3) Select DRIVE mode on control console.
- 4) Press down on foot switch
- 5) Release service brake and allow machine to coast by moving accelerator level slightly off centre. Speed should not exceed 3 mph.
- 6) After coasting a few feet, apply service brake and bring machine to a FULL STOP by returning accelerator level to the neutral position and releasing foot switch.

Travelling With Platform Down on a Level Surface

- 1) Maximum travel speed is attainable only when platform is down. (continued from Schedule "A") Genie Boom Aerial Lift
- 2) Always check to be sure route is clear of persons and obstructions.
- 3) Select Drive mode on control console.
- 4) Press down on foot switch
- 5) To change speed, move accelerator level slowly forward or backward.
- 6) To slow down, move accelerator lever to the opposite direction that the machine is travelling.
- 7) To stop, apply service brake by returning accelerator lever to the neutral position and releasing foot switch.

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Steering

- 1) Always check to be sure area around wheels is clear of persons and obstructions.
- 2) Select DRIVE mode on control console.
- 3) Operate steering toggle switch left or right as required
- 4) Steering is NOT self-centering – to return wheels to straight ahead position, use toggle switch.

Platform Rotation

Platform may be rotated to desired working position by turning manual hand crank in either a clockwise or counter-clockwise direction.

Raising Boom Riser

- 1) Check for overhead obstructions.
- 2) Select lift mode on control console.
- 3) Operate boom riser up toggle switch on control console.
- 4) Boom riser operates independently of Boom up or Boom extended.

Raising Boom

- 1) Select lift mode on control console
- 2) Operate Boom UP toggle switch on control console
- 3) Boom up operates independently of Boom riser or boom up.

Extending Boom

- 1) Select lift mode on control console
- 2) Operate boom extended toggle switch on control console.
- 3) Boom extend operates independently of Boom riser or Boom up (continued from Schedule "A" Genie Boom Aerial Lift)

Rotating Turret

- 1) Check for obstructions around the turret turntable and platform.
- 2) Select lift mode on control console.
- 3) Operate turret rotation toggle switch on control console.
- 4) Turret will rotate in either direction.

Never Travel With Platform Up

- 1) Always check to be sure route is clear of persons and obstructions
- 2) Select drive mode on control console
- 3) Press down on foot switch
- 4) To change speed, move accelerator lever slowly forward or backward.
- 5) To slow down, move accelerator lever to the opposite direction that the machine is traveling.

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- 6) To stop, apply service brake by returning accelerator lever to the neutral position and releasing foot switch.

Retracting Boom

- 1) Select lift mode on control console.
- 2) Operate Boom Retract toggle switch on control console.
- 3) Boom retract operates independently of Boom riser or Boom down.

Lowering Platform

- 1) Check for obstructions below platform
- 2) Select lift mode on control console
- 3) Operate Boom down toggle switch to descend
- 4) Operate Boom riser down toggle switch to descend.

Emergency/Ground Level Controls

If platform fails to retract or descend, never climb down boom assembly. Ask person on ground to actuate proper emergency controls to retract, rotate and lower platform. These controls are located at front of turntable.

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7.5.4 Schedule "B" – 6.52 – Genie Boom Aerial Lift Battery Maintenance

Check the battery fluid level daily, if machine is being used.

Charge batteries at the end of each work shift, or sooner, if the batteries have been discharged.

To Charge Batteries

- Leave battery pack cover open during all charging. Dangerous gases are present during charging so keep in well ventilated area.
- Connect charge A.C. cord to a properly grounded 115 volt, 60 HZ power supply which has adequate circuit breaker or fuse protection.
- Charge rate will vary from 20 to 29 amps depending on the state of discharge of the batteries.
- Charge rate will taper gradually to a finish of 5 to 10 amps when all cells are good.
- Charger turns off automatically when batteries are fully charged
- Replace defective cords or wires immediately
- Keep all charger ventilation openings free from obstructions.
- Keep battery tops free of moist, greasy film.

CAUTION

- This charger is for use on battery systems of the type and capacity specified on the charger name plate (36 volts) Use otherwise will damage charger and/or batteries.
- Do not expose charger to rain.
- For best battery life, follow detailed instructions in battery manufacturer's owners manual.

DANGER: Never perform service on machine while platform or boom linkage is elevated.

7.5.5 Schedule "C" – 6.52 – Genie Easy-up Set-up and Operating Instructions

Read and understand the operational Instructions Manual which is attached to the Genie shaft.

Set-Up

- Insert an outrigger into each of the four outrigger sockets. Lift the lock pin and continue sliding the outrigger until the pin snaps into the hole in the outrigger tube.
- Activate all four (4) floor locks before using this machine. Check the levelling bubble to make sure the base is level. (Bubble in the centre)
- If the equipment has levelling jacks, adjust the four (4) levelling jacks until the pads contact the ground. Observe the bubble jacks until the base is level.

Never use an easy-up that cannot be levelled.

Operating

- Fill battery with electrolyte if necessary and fully charge it. Place battery pack into position on back of base.
- Plug power cables into battery pack sockets so that colours are matched; black to black, red to red. Push plug in and twist it clockwise to lock in place.
- On AC models, attach pigtail power chord (12 gauge) to your extension chord and connect to a 115V, single phase 3 wire grounded circuit at least 105V.
- To raise or lower the platform in normal operation, use switch on the railing.
- In case of emergency or power failure the platform can be lowered from the ground level using the emergency down lever. Located at the side of the power unit, clearly indicated by a yellow decal.

Transport

- Remove outriggers to transport the unit through a standard 28 inch doorway.
- Transport the Easy-up in an upright position with the basket in its lowered position.

Maintenance

- Maintain even tension on chains; do not allow any to go slack. Due to slight stretch after a period of use the chain tension may need adjusting. To adjust, elevate the platform until chain terminal rods are exposed at the bottom of each mast section. Back off bottom lock nut and tighten top nut. Be sure bottom nut is again locked tight against top nut after adjustment. Check to be sure each pair of chains have equal tension. (continued from Schedule "C" Easy-Up Operating Instructions)
- The cables on the outside of mast keep individual sections from sliding apart. Assure proper sequence of retraction when lowering. Adjust only to remove slackness – do not over tighten.

Maintenance Procedures

- Inspect chains or cables each time before using.
- Keep chains well lubricated and adjust as necessary for even tension.
- Adjust outside restrainer cables to maintain slight tension. Do not over tighten, just remove the slack.
- If necessary to add Hydraulic fluid, it is recommended to use a good quality SAE 10 grade. Hydraulic oil for operating is in the general temperature range of 0F. – 160F.
- The power unit is equipped with an inlet screen filter. The area of the filter is sufficient and the unit should run for a long period of time using CLEAN oil before the filter is clogged to the point where it would affect the operation of the unit.

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- Periodic inspection, and if necessary, cleaning of the filter is recommended. To gain access to the filter, it is necessary to drain the reservoir of oil and remove the screws which attach it to the motor adaptor. The filter is screwed onto the pipe nipple which leads to the pump. Use care in removing the filter as not to collapse it. Wash in suitable solvent and blow out with air from inside out. Over tightening of the reservoir screws on assembly can strip the threads in the motor adaptor. A moist pump is generally an indication of a clogged filter.
- Neither the pump nor the motor require any attention under normal operating conditions. The motor bearings are life-lubricated. The pump bearings are lubricated by the fluid being pumped.
- Protect the Easy-Up from exposure to rain and adverse weather conditions. Do not allow water on electrical controls or connections.

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7.5.6 Schedule "D" – 6.52 – Genie Easy-Up Battery Charging and Care

- Leave Battery pack cover open during all charging. Dangerous gases are present during charging – keep in a well ventilated area.
- Connect charger extension cord to a grounded AC 3-wire electrical system that has adequate circuit breaker or fuse protection.
- For lightly discharged battery, set timer to 7 hours. For well discharged battery, set to "on" (12 hours) Charger automatically turns off at end of set period.
Keep battery charged – DO NOT OPERATE the easy-up with a low battery!
- Check the battery condition prior to use. Turn on charger and see if ammeter needle jumps upward and then tapers down to finish rate area within 15 minutes. Check at least once a month if Easy-up is NOT being used.
- The state of discharge of the battery will be slightly different each time they are put on charge, but the charger automatically varies the initial charge rate and taper of charge rate over the charge period. (See operation instructions attached to the easy-up.)
- All cells of the battery must be good, rising to approx. 2.5 DC volts per cell while still on charge or near the end of a charging period.
- Connections on the battery terminals and connector wiring must be clean and tight.

The necessity of adding water more frequently than every two or three weeks, and/or hot battery case at the end of charging cycle, indicates the finish rate is too high, due to one or both of the following:

One or more bad cells in the batteries

Battery is starting to age to the point where hours of charge should be reduced gradually to obtain prolonged battery life.

Battery Care (DC Powered units only)

- 1) New batteries should be given a full charge before their first use, as it is difficult to
- 2) Know how long the battery may have been in storage without a charge. (continued from Schedule "D" Genie Easy-Up Battery Care)
- 3) Limit use of new batteries between charges for the first 5 cycles. New and older batteries are not capable of their rated output until they have been discharged and charged a number of times.
- 4) During the first month of use and particularly when temperatures are below 60F. New batteries should be given a full charge once a week.
- 5) The charger usually tapers down to the specified finish charge rate near the end of the charge cycle. The last 1 to 3 hours at the low finish charge rate equalizes the cells for better battery life.
- 6) When batteries age to the point where the charge rate will no longer taper into the low finish rate area, reduce the hours of charge progressively. Reducing the charge period will prevent excessive battery heating and the resultant high water use rate.
- 7) Add water carefully to the proper levels in cells as required after they have been fully charged. Don't fill too high so that they would bubble over while charging.
- 8) When temperatures falls below 65F. Batteries should be placed on charge as soon after use as possible.
- 9) Keep the tops of the batteries hold-downs and dry at all times. This will reduce the amount of current leakage between batteries and the frame.

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7.5.7 Schedule "E" – 6.52 – Genie Easy-Up Safety Rules

- Study and understand operating manual before using the equipment, which is located in a tube attached to the Genie.
- Do not exceed the maximum load rating of 300 lbs. This includes one person and all equipment carried in the basket.
- A second person should be in the area, in case of any necessary required help is needed.
- There is an emergency lowering lever which should be reviewed with the person on the ground in case of an emergency.
- Use on a level surface, unless equipped with levelling jacks. Never adjust levelling jacks with a person in the basket.
- On lift equipment with standard outriggers and casters, lock outriggers in extended position and activate floor lock.
- Unit base must be level before using the Easy-Up. Check levelling bubble.
- Do not operate on an elevated platform, scaffold truck bed or extended surface or support.
- Platform is NOT electrically insulated.
- **ONLY ONE PERSON MAY BE IN THE BASKET.**
- Do not climb, stand on or sit on the basket railing
- Do not lean a separate ladder against the Easy-up. Never apply a side load force to the unit by pushing or pulling from the basket or by hanging heavy wires or cables over the side.
- Do not move the Easy-Up when the basket is elevated.
- Do not operate near overhead electric lines and obstructions.
- Do not stand under the loaded basket.
- Observe maintenance instructions.
- If possible rope- off the area around the equipment to ensure no person will be under the equipment.
- Should the lowering mechanism fail, the person on the ground may use the emergency lowering lever to bring the bucket to the ground.

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7.6 Hazard Identification & Reporting

7.6.1 Intended Use Or Application

To provide information, instruction and supervision to an employee to protect the Health & Safety of the employee and to acquaint the employee with any known hazard in the workplace. To ensure the employees are aware of how to report a hazard, should it be necessary.

When an employee is exposed to a biological, chemical or physical agent which may endanger his/her safety or health, the employee shall be trained in the proper use, precautionary measures, personal protective equipment, and in the use of emergency measures and procedures.

7.6.2 Work Steps

Hazardous Chemical Storage Rooms are identified and located near the shipping area in the south-east end of the building. These locations are identified on the emergency maps throughout the building.

Hazardous products are all labelled and contain WHMIS identification.

No eating or drinking in any of the Labs or the machine shop where hazardous fumes or products are present.

Other hazardous zones have been identified with warning signs and illuminated hazard signs.

7.6.2.1 Instructions

- 1) When products are purchased, it is the responsibility of the requisitioner to do a search to see if a less hazardous product is available.
- 2) The Joint Health & Safety Committee will perform a monthly inspection as well as being on guard every day, to identify any workplace hazards and these will be brought to the committee for recommendations on how to eliminate this problem, solve or control it. Hazard classification will be identified on the inspection list to identify its priority, as follows:

Class "A" A condition or practise likely to cause permanent disability, loss of life or body part and/or extensive loss of structure, equipment or material.

Class "B" A condition or practise likely to cause serious injury or illness (resulting in temporary disability) or property damage that is disruptive, but less severe than class "A".

Class "C" A condition or practise likely to cause minor (non disabling) injury or illness or non disruptive property damage.

Class "H" Housekeeping issues which present an unsafe situation or promotes a health concern.

- 3) No employer or person acting on behalf of an employer shall:

Dismiss or threaten to dismiss a worker; discipline or suspend, impose any penalty, intimidate or coerce an employee because of reporting any hazard or reason to believe their Health & Safety may be in danger.

7.6.2.2 Person Responsible Is Required To

- 1) Identify all hazardous substances and agents.

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- 2) Obtain Health & Safety data prior to its use as outlined on the Material Safety Data Sheets.
- 3) Ensure the handling procedures and other precautions are made known to and followed by all employees involved.
- 4) Ensure that a workplace inspection takes place monthly by a certified member, or delegate, accompanied by a management committee member and report in writing any unsafe or hazardous issues on the inspection report.
- 5) Conduct a risk assessment by identifying hazards before a job commences or for workplace locations.

7.6.2.3 Employees Are Required To

- 1) Advise your manager if you locate any containers on the premises without a proper label so that the necessary information may be placed on the container immediately.
- 2) Notify your manager of any known contravention of this Act or Regulations or the existence of any known hazard.
- 3) Complete a Hazardous Reporting Form HR040 and give immediately to your manager, if you wish to identify a hazardous situation or problem, to ensure your concern will be corrected, controlled or eliminated.

7.6.2.4 Managers Are Required To

- 1) Take every precaution reasonable in the circumstances for the protection of the employee.
- 2) Conduct a risk assessment to identify hazards before a program commences or in any area of the workplace which may be necessary.
- 3) Promptly investigate a report on a hazard, in the presence of the employee who reported it, and report back to the employee and the Health & Safety Committee the corrective steps and date for completion.
- 4) Ensure an Inspection Reporting Form HR039, for any new, modified or existing equipment is completed by the EHS Manager.
- 5) Schedule "B" & "C" for details. The EHS Manager will be accompanied by a JHSC member and/or any other required person.
- 6) Ensure any deficiencies identified on the form are corrected.

7.6.2.5 Health & Safety Manager Is Required To

- 1) Approve any WHMIS controlled product prior to placing an order or before samples are shipped to MDA.
- 2) Ensure that MSDS's are in the appropriate department binders.
- 3) Provide instruction on the hazards and safe handling of any new chemical with the intended users.
- 4) Provide WHMIS labels to the Receiver/Material Support Operator if the existing label has been damaged and is not legible.
- 5) Convene with management should a serious issue as identified in writing by the Health & Safety Committee not be corrected within a reasonable time frame.
- 6) Keep on file all relevant reports.

7.7 Hearing Conservation

7.7.1 Intended Use Or Application

To reduce the risk of noise-induced hearing loss when daily exposure levels are 85 decibels (dBA) and greater, or if an employee has a sensitivity to noise exposure.

7.7.2 Other

Noise exposure may result in hearing loss when the noise levels are greater than 85 dBA and the time of exposure increases.

7.7.2.1 Employees Are Required To

- 1) Use or wear any protective device that the employer requires or prescribes.
- 2) Attend training sessions which are provided by the company.
- 3) Notify the Manager, should there be a concern of excessive noise in the area in which he/she is to work.
- 4) Ensure the hearing protectors are maintained, checked for wear and cleaned on a regular basis.
- 5) Make no alterations to the hearing protectors or any other adjustments, as this may reduce their effectiveness.

7.7.2.2 Managers Responsible Are Required To

- 1) Advise the worker of the existence of any potential or actual danger, of which he/she is aware.
- 2) Implement some method of controlling noise such as:
 - a) administrative controls (posting signs, rotating workers)
 - b) engineering controls (selecting quieter equipment, redesigning, enclosures, sound absorbing materials and silencers, reducing vibration)
 - c) provide protective equipment, as the last resort.
- 3) Notify the EHS Manager if there is a concern about a noisy environment.
- 4) Ensure that an employee uses or wears any protective device that the employer requires.
- 5) Enforce that employee work in a manner with protective devices, measures and procedures required by the Occupational Health & Safety Act and the Regulations.

7.7.2.3 Health & Safety Manager Is Required To

- 1) Provide instruction on how to properly fit and wear hearing protectors.
- 2) Provide adequate hearing protection that will reduce the noise levels below the required except able level.
- 3) Record the noise levels as indicated on the sound level meter, at least annually or in areas as required.
- 4) Post signs recording the noise levels at the entrances of areas greater than 85 dBA or more Form to be returned to the EHS Manager upon completion.

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7.8 Industrial Lift Trucks

7.8.1 Intended Use or Application

To establish safe operational practices in the use of fork lift trucks.

Wherever referral is made directly to the operation of fork lift trucks. To ensure a preoperational check by completing the fork lift checklist provided.

7.8.2 Instructions

A lift truck is designed only for lifting and moving of loads. If you are the designated person to service the battery, please follow Schedule "A". Certified Fork Truck Operators are listed in Schedule "B".

7.8.2.1 Employees designated as Lift Truck Operators are required to

- 1) Have lift truck training on the use and safe operation of a fork truck prior to operating the vehicle, with a refresher course every three years. An evaluation is to be conducted every 18 months.
- 2) Be instructed on the generic safety operation procedures of a lift truck in accordance with the Manufacturer's Operator Manual, the employer's operating guidelines, government regulations (OHSA) and your trainer's manual.
- 3) Complete a visual driver's check list daily or pre-shift, in accordance with HR051 and HR053 before operating the fork truck.
- 4) Report all problems and defects to your supervisor/manager immediately.
- 5) Know the correct steps to safely shut down and park the lift truck with parking brakes set and control lever in neutral with the forks/mast lowered to the ground, tilted forward.
- 6) Know the safe practices of starting, stopping and turning as well as properly mounting and dismounting the vehicle as well as knowing how to approach the load and how much weight your fork truck is capable of handling.
- 7) Know all the factors affecting the stability of the lift truck and what is meant by the "centre of gravity".
- 8) Ensure that no load passes over any worker.
- 9) Use one or more guide ropes if a worker may be endangered by a rotating uncontrolled motion of a load.
- 10) Have an operator at the controls when a load is in a raised position.
- 11) Be familiar with the location and information on the capacity plate. (Identification Plate).
- 12) Be instructed on the safe procedures for operating a lift truck on ramps and grades (operating in gear) and bearing in mind the maximum permissible slope.
- 13) Ensure clear visibility in the direction of travel and when ascending and descending a ramp, approach the ramp with the counterweight on the upper side.
- 14) Ensure that wheel chocks are fully in place under the trailer's rear wheel, before loading or unloading a trailer using a fork lift truck. Ensure the wheel chocks are removed when the loading/unloading of the shipment is completed.
- 15) Carry loads so that they rest against the back of the fork carriage, whenever possible.
- 16) Know the hazards associated with the lift truck operation such as slippery surfaces, travelling over railway tracks, weight restrictions and operator blind spots.
- 17) Use platforms specially designed for lifting, lowering or supporting personnel. The cage must be safely secured to the forks.

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- 18) To wear an appropriate safety harness and life-line when inside the cage, should you be lifted by a fork lift truck.
- 19) Become familiar on how to use the fire extinguisher attached to the unit.
- 20) Maintain a safe speed at all times. Keep all body parts inside of the body of the truck.
- 21) Give the right of way to pedestrians.

7.8.2.2 Managers are required to

- 1) Ensure fork truck training is COMPLETED before the employee operates the vehicle.
- 2) Ensure the safety regulations are being followed to ensure a safe operation.
- 3) Ensure the daily check list (pre-inspection) is being completed, signed and forwarded to the EHS Manager.
- 4) Ensure that wheel chocks are being used before loading or unloading any shipments.
- 5) Provide Personal Protective Equipment, if required in accordance with Schedule "A" should the battery need servicing.
- 6) Ensure that a safety harness and life line is worn, should an employee be required to be elevated inside a cage.
- 7) Ensure lift trucks are not operated in areas containing flammable liquids or explosive mixtures.
- 8) Ensure the lift trucks is equipped with a fire extinguisher.
- 9) Ensure the floor or yard is maintained in a smooth and level state.
- 10) Ensure the horn or other warning devices loud enough to be heard above other noises.

7.8.2.3 Health & Safety Manager is required to

- 1) Provide current legislative information regarding the safe operation of powered lift trucks.
- 2) Support and reinforce the safe operation of powered lift trucks as outlined by the regulations and the employer.
- 3) Filing and maintaining completed Lift Truck inspection forms.
- 4) Arrange fork lift truck training prior to the use of the vehicle.
- 5) Ensure that training is scheduled every three years by a qualified consultant and an evaluation is done every 18 months.



7.8.3 Schedule " A " – Fork Lift Truck Battery Maintenance

WHETHER THE BATTERY PROVIDES TRACTION OR AUXILIARY POWER, IT DEMANDS RESPECT.

BATTERIES CONTAIN ACID, WHICH BURNS.

IT RELEASES HYDROGEN, WHICH EXPLODES.

IN ANY OPERATION SERVICING A BATTERY, FOLLOW THESE RULES:

- No smoking
- No open flames (use a plastic flash light if necessary)
- Keep metal objects away from the cells, including screwdrivers
- Use proper tools
- Protect your eyes
- Remove rings and bracelets
- Use personal protective equipment, gloves, face shield and apron
- Flush acid spills or splashes with large quantities of water. Quickly remove any contaminated clothing.

***For your safety, ensure that wheel chocks are in place before loading or unloading any vehicle. Remove the chocks after your shipment is completed.**

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7.9 Industrial Robot Safety

7.9.1 Intended Use Or Application

To ensure that any person who programs, operates, maintains, or repairs robots or robot systems is trained and demonstrates competence to perform the assigned task safely.

Whenever Industrial Robots and Robot Systems are in place, specific safety requirements must be followed.

7.9.2 Referenced Documents

ANSI/RIA R15.06-1999	American National Standards Institute
OHSA	Occupational Health & Safety Act & Regulations
MDR-STD-M.7915, 6.13	Electrical Safety Lock-out
MDR-STD-M.7915, 6.32	Personal Protective Equipment
UL 1740,	Underwriters Lab Specifications International Part 6, ISO
10218:1992	Standards Organization
Schedule "A"	R & D Lab Emergency Contact Persons
Schedule "AA"	Sensor Lab Emergency Contact Persons
Schedule "AAA"	Electrical Lab Emergency Contact Persons
Schedule "B"	ANSI/RIA operating form
Schedule "C"	Robotic Club Procedures
Schedule "D"	Robotic Club Members
Schedule "E"	Industrial Robot Safety Personnel Requirements

7.9.3 Work Steps

Necessary components in every safeguarding system are the maintenance and the intended use of the system.

The ultimate link in safeguarding a system is the person.

Personnel skill, training and attitude are important factors.

Triceratops guidelines fall under Industrial Robots and Robotic Equipment.

7.9.3.1 Each Operator is required to

- 1) Receive instruction and fully understand the operation and hazards of a Robot before working in the area.

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- 2) Read, understand and follow industry safety procedures and standards, ANSI Standard, ANSI/RIA R15.06-1999.
- 3) Sign an acknowledgement form and return to the EHS Manager after having read and understood the ANSI/ RIA prior to operating the equipment. See Schedule "B"
- 4) Verify that the following has been installed correctly and/or as intended, before applying power according to the ANSI Standard 8.4.1
 - a) Mechanical mounting and stability
 - b) Electrical connections
 - c) Utility connections (e.g. tool exchange plate air supply)
 - d) Communications connections(e.g. hand controllers)
 - e) Peripheral equipment and systems
 - f) Limited devices for restricting the maximum envelope (space)
 - g) all personnel exit the restricted area prior to applying drive power.
- 5) Ensure that safeguards are in place, know there limitations and ensure all employees are outside the cage surrounding the robot system before applying power drive.
- 6) Know their specific task and responsibility of their job as well as to identify and recognize the hazards associated with each task.
- 7) Become familiar with Schedule "A", so as to know who to contact in case of a problem or emergency situation.
- 8) Report any unusual operating conditions to your manager.
- 9) Become familiar with the location of the emergency stop button and its function.
- 10) Know the proper functions and limitations of all safeguards.
- 11) Follow the initial start-up procedure as indicated in the ANSI/RIA R15.06-1992, under 8.4.
- 12) Wear safety glasses when working with cutting tools in accordance with MDR-STD-M.7915, 6.32
- 13) Wear CSA safety approved footwear with steel toes and electric shock resistant when working on or around the robot, or any other required Personal Protective Equipment in accordance with MDR-STD-M.7915, 6.32
- 14) Ensure that no person shall enter the safety cage while the system is in operation.
- 15) Observe and follow all the safety signs in the area.
- 16) Work at all times with at least two people in the area, when operating equipment.
- 17) Work on electrical equipment only if the person is competent or qualified.
- 18) Test the emergency stop each time the system is powered up or after downloading new software.
- 19) Be retrained should any of the operation systems change.
- 20) Report any accident to the shift supervisor immediately and to the Program Manager within one hour.
- 21) Ensure that all appropriate guarding is in place and used.

7.9.3.2 Managers are required to

- 1) Ensure that every operator and employee working in the area receives training, prior to the operation of a robot system and understand this directive.
- 2) Get the acknowledgement forms signs by the designated people and a copy forwarded to the EHS Manager.

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- 3) Ensure that all the safety regulations are followed and that employees work in a safe manner as prescribed.
- 4) Ensure that an emergency stop button has been installed and the employees are familiar with its location.
- 5) Post required signs as well as post contact names and telephone numbers for first aiders and emergency contact persons.
- 6) Ensure that employees working on electrical equipment must be qualified by training or experience. Any live electrical work must be done by a licensed electrician. Safety Lockout procedure to be followed as in accordance with MDR-STD-M.7915, 6.13
- 7) Ensure that all appropriate guarding is in place and used.

7.9.3.3 Health & Safety Manager is required to

- 1) Ensure that training is provided, or/as requested by the Manager, prior to the operation of the robot.
- 2) Keep on file the acknowledgement forms, Schedule "B" and/or Schedule "C"
- 3) Monitor the safety of the operation to ensure that the requirements are being followed.

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7.9.4 Schedule "B" – 6.45

I have read and understand the workplan on Robot Safety (MDR-STD-M.7915, 6.45). I understand where to locate the ANSI/RIA R 15.06-1999, ANSI Standard for Industrial Robots and Robot Systems Safety Requirements as well as the UL-1740 Standards and I fully understand the hazards prior to working in this area or before operating this equipment.

Name:

Print

Date:

Signature:

This summary includes only the safety requirements for operating the equipment in the MDA facility and does not include installation (e.g. using cranes) and integration (e.g. lockout)

Self-Taught Instructional Course

Time to complete:

Please return this signed copy to the EHS Manager.

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7.9.5 Schedule "C" – 6.45 – MDA's Robotics Club Procedures

- 1) Only robot club members shall be allowed in the allocated club work area.
- 2) Membership list, Schedule "D" shall be maintained by the EHS Manager and posted in the area.
- 3) Personal tools/equipment can be brought to MDA by filling out the "Security Pass for Equipment" form, obtained from Security.
- 4) MDA shall not be responsible for any loss or damage to personal belongings.
- 5) Test equipment can be borrowed by following the standard process. See processes PE-PR.014 and PE-PR.032.
- 6) Members must keep the club work area clean and organized and items must stay within the area. Failure to do so will result in the removal of the items.
- 7) Members shall not borrow tools/parts from other projects within MDA without proper approval.
- 8) Food and drink must not be consumed in the lab.
- 9) The Environmental Health & Safety Policy, HR-POL.016 must be adhered to when using the designated club area. When in need of assistance, contact a technology safety expert as noted in, MDR-STD-M.7915, 6.19 also posted in the area.

In order to become a club member and work in the designated work area, all members must accept and understand the rules of the Robotics Club.

- 1) Have read and understood the workplan on Robot Safety MDR-STD-M.7915, 6.45
- 2) Reviewed and understand where to locate the ANSI/RIA R 15.06-1999, ANSI Standard.
- 3) Reviewed and understand where to locate the UL-1740 Robotic Information.
- 4) Signature must accompany this form, indicating that you are fully aware of the hazards of Robotic equipment before commencing to build or operate such a project.

Failure to follow the Robotic rules and regulations will result in membership being revoked.

Employee Name:

Print

Employee ID#:

Date:

Signature:

Return this form to the Health & Safety Manager.

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7.10 Laser Safety

7.10.1 Intended Use Or Application

To ensure that this procedure provides reasonable and adequate guidance for the safe use of lasers and laser systems through the classification of the units according to their relative hazards and identification of appropriate controls for each classification.

To ensure employees who request access into the Laser Lab (R & D) will first participate in and complete the computer based Laser Safety Training Program.

Where lasers of Class II and above are in operation, an effective laser safety program must be in place and training is required. This needs assessment is required by the Laser Safety Manager for hazards and safety measures on a regular basis.

Short term usages in other areas shall be governed by temporary permits.

7.10.2 Work Steps

Special attention shall be given to:

- 1) the installation of adequate warning systems and signs
- 2) optical radiation hazards
- 3) electrical hazards
- 4) the type of environment in which the laser will be used
- 5) assigning risk categories for those personnel scheduled to work with lasers and ensuring arrangements are made for the appropriate medical surveillance

Medical Surveillance:

(See Schedule "A")

The company will pay for medical examinations recommended in ANSI Z136.1-1993, appropriate to the risk level of the employees who may be exposed to laser hazards.

These yearly examinations shall be undertaken previous to participation in laser work and following any suspected laser injury and/or recommendations by the Optometrist. EHS will record the results of these examinations. No medical surveillance is required for personnel working with Class I or II lasers as defined in ANSI Z136.1-1993.

Every two years, anyone actively engaged in the operation of any laser equipment, shall be retrained to comply with MDA Laser Safety Program.

These reports are kept on file with the EHS Manager.

External Laser Facilities:

For situations where personnel are working with another agency which has laser equipment, the Laser Safety Manager shall be consulted for a decision as to which set of procedures are to be followed.

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7.10.2.1 Control Measures

Control measures are implemented to ensure that:

- 1) the minimum laser radiation required for the application is used.
- 2) the beam height is maintained at a level other than the normal position of the eye of a person in the standing or seated position.
- 3) access to laser radiation is limited
- 4) the possible exposure level is reduced to a level at or below the applicable.

Types of control measures which may be implemented:

- 1) engineering controls
- 2) administrative
- 3) procedural
- 4) personal protective equipment

Engineering controls are the preferred method of control to minimize or isolate the hazard. However, if the engineering controls recommended are not feasible or adequate they may be replaced by administrative, procedural or other alternate engineering controls which provide equivalent protection. Control measures implemented are based on the radiation hazard level, and must be reviewed and approved by the Laser Safety Manager.

Proper Personal Protective Equipment (PPE) must be worn as indicated herein, or/and any other clothing suggested by the Laser Safety Manager.

7.10.2.2 Laser Pointers

Pen-like laser pointers produce a very narrow bright red beam which is extremely hazardous to the unprotected eyes of an individual and have caused eye damage as a result of improper use.

- Do not stare into the laser beam or direct the beam towards a person's eyes.
- Reflective surfaces should be avoided when directing the laser beam, as they can act like a direct beam on the eye.
- Avoid dropping the Laser Pointer on hard surfaces.
- Remove batteries if Laser Pointer is not used for a long period of time.
- Do not attempt to disassemble or repair.
- Use a cotton bud or Q-Tip to clean the lens and not any strong chemicals or abrasive cleaners.
- Repeated presses of the on button will emphasize a point and do not keep switched on for more than a few seconds.

Some of these devices have a warning label on them but others are advertised as "safe". Users of these pointers must never aim the pointer into the audience. These devices are not toys and should not be used by children.

Laser pointers are available in different classes. Class I, Class II, Class IIIA and Class IIIB. In all cases eye exposure should be avoided. Do not use Class IIIB laser pointers. This is the pointer which could do the most eye damage. Laser pointers are very useful in presentations but use them with caution.

Lasers are divided into a number of classes depending upon the power or energy of the beam and the wavelength of the emitted radiation. Laser classification is based on the laser's potential for causing immediate injury to the eye or skin and/or potential for causing fires from direct exposure to the beam or from reflections from diffuse reflective surfaces. A qualitative description of laser classes can be found below (ANSI Z136.1-2000).

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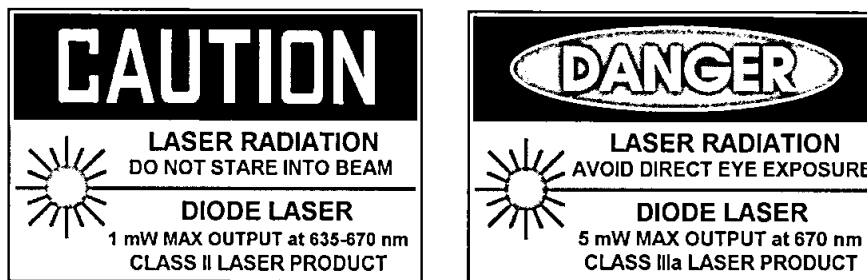
Class I: Considered to be incapable of producing damaging radiation levels, and is therefore exempt from most control measures or other forms of surveillance.

Class II: Emits radiation in the visible portion of the spectrum, and protection is normally afforded by the normal human aversion response (blink reflex) to bright radiant sources. They may be hazardous if viewed directly for extended periods of time.

Class IIIa: Laser or laser systems that would not normally produce injury if viewed only momentarily with the unaided eye, they may present a hazard if viewed using collecting optics, e.g. telescopes, microscopes, or binoculars.

Class IIIb: Can cause severe eye injuries if beams are viewed directly or specular reflections are viewed. A Class 3 laser is not normally a fire hazard.

When using Class III lasers ensure proper signage is affixed in work areas, such as:



Class IV: Hazard to the eye from the direct beam and specular reflections and sometimes even from diffuse reflections. Class IV lasers can start fires and can damage skin.

Class II laser products

Lasers categorized as Class II cannot harm the retina because the human blink reflex is sufficient to provide protection. The power output is less than 1 mW. They are generally in the wavelength range of 630-680 nm.

Class IIIa laser products

Class IIIa lasers, which can be safe for momentary viewing, are a recognized eye hazard if viewed through optics (telescopes, magnifiers). The power output is between 1-5 mW. They are generally in the wavelength range of 630-680 nm.

7.10.3 Work Steps

7.10.3.1 General Operating Procedure

Lasers are to be used in isolated areas where staff access can be controlled and laser beam path hazard zone can be clearly delineated and controlled.

Given the developmental nature of our work and the skilled types of staff involved, it is only expected that detailed task specifics procedures will be written for temporary and special tasks.

Normal tasks shall have safety enforced by the parallel use of passive facility precautions and staff training.

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Professional staff, once trained is expected to take responsibility for planning there use of lasers in a safe manner and ensure they are operated in a safe manner in a safe area.

The work area shall have three concentric zones:

- 1) an area outside the locked perimeter where all staff can go.
- 2) an inner work zone accessed by key where staff normally work.
- 3) a hazard zone marked off with protective curtains or barriers where staff wear special laser protective goggles, when the laser is in use.
- 4) Visible warning signs and lights shall be placed at the intersection of each zone

7.10.3.2 Laser Safety Manager Is Required To

- 1) Participate in training and arrange for required employees to participate in the Computer Laser Training Program to fulfil the required responsibilities of competency.
- 2) Work with responsible managers to ensure all personnel working in the area are adequately trained, medically screened, aware of safety practices, precautions and procedures.
- 3) Approve all new laser areas and new or modified laser equipment and installations, in the planning stages and prior to use.
- 4) Assist managers in accommodating any worker identified by the examining optometrist or physician as unfit to work with lasers.
- 5) Ensure laser is labelled with the appropriate hazard classification.
- 6) Designate temporary laser controlled areas for service or maintenance personnel if laser hazard level changes.
- 7) Recommend required control measures based on the information gathered during the hazard assessment.
- 8) Ensure that prescribed control measures are in effect and periodically audit the functionality of the control measures in use. See control measures under # 6.
- 9) Suspend, restrict or terminate the operation of a laser system, if control measures are deemed to be inadequate.
- 10) Develop, implement and/or audit training programs, in conjunction with the EHS Manager to ensure that adequate safety education and training is provided to the laser personnel.
- 11) Approve standard operating procedures, alignment procedures and other procedures that may be part of the requirements for administrative and procedural control measures.
- 12) Ensure that appropriate protective eyewear is worn as required and inspected on a regular basis.
- 13) Ensure that proper PPE is worn or any additional clothing recommendations.
- 14) Determine need for yearly medical surveillance program (eye or skin examination) and communicate findings to the EHS Manager.
- 15) Maintain an inventory of all lasers used in the designated areas.
- 16) Prepare Incident Reports and investigate incidents and accidents with the EHS Manager recommending specific corrective actions.
- 17) Maintain laser safety documentation, including Laser Safety Training Scores, with a copy forwarded to the EHS Manager.
- 18) Ensure that a laser protective barrier or/ or curtain is used for Laser III and above, at the entrance and inside the controlled area to prevent the laser light from exiting the area.
- 19) Ensure the material of the laser protective barrier and curtains do not support combustion and is of a decomposition product.

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20) Ensure that skin is covered with tightly woven fabrics and opaque gloves, for Laser 111 and above.

7.10.3.3 Laser Operators and Personnel Are Required To

- 1) Review MDA Laser Medical Surveillance Program, Schedule "A"
- 2) Notify your manager/supervisor, if at any time your medical condition deems you unsuitable to work in the laser environment.
- 3) Ensure that computer-based training course has been completed from the Laser Safety Manager, before any laser operations.
- 4) Obtain appropriate information from the laser Safety Manager or EHS Manager before going for your eye examination as required.
- 5) Arrange for yearly appointment with the company identified optometrist or physician, as appropriate.
- 6) Inform the EHS Manager when you have completed your eye examination.
- 7) Be escorted by trained personnel, into the laser areas as well as into the hazard zones.
- 8) Comply with the safety rules and procedures prescribed.
- 9) Remain outside the hazard zone when the hazard light is flashing, except when wearing suitable laser protective eyewear under the instruction of a Laser Operator.
- 10) Be authorized and trained when using diffusely reflective materials in or near the beam path.
- 11) Have a key or authorized card to enter the Laser areas.
- 12) Wear special eye protective glasses, in the hazard zone, when laser IIIA or above is in operation.
- 13) Ensure all personnel working in the area will understand the hazards, be adequately trained, medically screened, aware of all safety practices, precautions, and procedures and aware when the lasers are in operation.
- 14) Permit the operation of a laser only where there are adequate warning systems in place.
- 15) Report as soon as possible all real or suspected accidents involving lasers to the Laser Safety Manager.
- 16) Ensure that appropriate medical attention is obtained for an employee involved in a laser accident.
- 17) Allow only qualified personnel to maintain lasers and associated equipment.
- 18) Have the laser secured, if possible, in such a way that the beam path is above or below eye level of a person standing or sitting.
- 19) Ensure that all windows and doorways, open portals from an indoor facility be covered or restricted with special material so as to reduce transmitted laser radiations below the applicable ocular MPE. (Maximum Permissible Exposure)
- 20) Leave any equipment not in use, disabled, so as to prevent unauthorized use.
- 21) Know the location of the emergency panic button or control key switches, in case it is necessary to deactivate the laser or reduce the output levels in critical areas.
- 22) Be familiar with the rapid egress and admittances, which have been designed for safety controls.
- 23) Wear, when using Class IV laser, tightly woven fabrics to cover the skin, opaque gloves and a laboratory jacket with long sleeves, for arm and hand protection.
- 24) Ensure the work for Class II and above have a lock to limit access, proper warning signs, physical barriers or other suitable methods to delineate zone within the work area.
- 25) Advise other staff in the area through visible or sound warnings that laser is being operated and when turned off.
- 26) Not be exposed to direct laser energy.

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7.10.3.4 Managers Are Required To

- 1) Provide employees working in a laser environment, with "Laser Medical Surveillance Program Information" and "Employee Report" to be completed, signed and forwarded to the EHS Manager.
- 2) Work with the Laser Safety Manager and EHS Manager to ensure any employees found to be unfit are accommodated appropriately.
- 3) Submit the physician and optometrist reports to the Laser and EHS Manager.
- 4) Ensure all personnel working with lasers II and above, will be adequately trained, medically screened, if necessary, aware of safety practices, precautions and procedures.
- 5) Provide information to the Laser Safety Manager on proposed laser purchases, new installations or any laser equipment coming on site, even with contractors.
- 6) Acquire support from the Laser Safety Manager to ensure safety precautions are implemented before any new equipment/facilities are commissioned.
- 7) Outline any information on new items to be ordered and give this to the Laser Safety Manager.

7.10.3.5 Health & Safety Manager Is Required To

- 1) Coordinate the laser medical surveillance program.
- 2) Maintain the procedure for the laser medical surveillance program.
- 3) Retain completed optometrist reports.
- 4) Review the optometrist and physician reports to track the time for subsequent examination visits.
- 5) Notify participating employee's manager of examination due date one month in advance.
- 6) Assist the Laser Safety Manager in providing appropriate training to laser users, as required.
- 7) Audit procedures, control measures and training to ensure laser safety program is effective.
- 8) Authorize access cards into the Laser Lab, only after the training requirements have been completed.
- 9) Monitor any Laser report and keep for a 20 year period. Destroy only after written approval for the Corporation.
- 10) Keep copies of Laser Safety Training Program Acknowledgement, Schedule "C" forms.

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7.10.4 Schedule "A" – 6.47 – Laser Medical Surveillance Program

To ensure the safety of their employee's and to make employee's understand the dangers of the Laser equipment, MDA, has introduced a Laser Safety Medical Surveillance Program.

- Employees, who work in any Laser Lab using Laser III and above and require an access card into this area, must first complete MDA's Computer Laser Training Program available under the direction of the Laser Safety Manager.
- Within two weeks of completing the Computer Laser Training Program, the employee must make an appointment with the approved Optometrist, for an eye examination.
- This special eye examination, for working with Lasers, will take approximately one-half hour. According to the frequency of use with Laser equipment, the optometrist along with the Laser Safety Manager will determine your next examination. Those rarely using Lasers may only be required to have this examination once every three years.
- The employee must identify himself as a MDA employee when visiting the doctor as the invoice will be sent to the EHS Manager for reimbursement. OHIP pays once every two years for an eye examination, so MDA will pay for this service as well as your time away from work, as long as your manager is notified and agrees upon the time you are away.
- When you return from your appointment, please notify your EHS Manager, so that this may be recorded and the invoice approved for payment.
- Computer Laser Training must be reviewed every two years or less, depending upon the requirements by the Laser Safety Manager and on how much the equipment is used.
- Should your services terminate with MDA, you must arrange for an appointment with the company approved Optometrist, in order to have your eyes examined and your file closed. The Laser Safety Manager or the EHS Manager will sign this off on the Clearance of Termination form.

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7.10.5 Schedule "B" – 6.47 – Laser Employee History

Available upon request, from Health and Safety Manager.

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7.10.6 Schedule "C" – 6.47 – Laser Safety Program Acknowledgement

To receive permission to work on Laser IIIA or above projects, I understand that I must review the Laser, self-taught program administered by the Laser Safety Officer. (Computer based training course)

To receive access into the Laser Lab, or any other laser designated areas, I must have completed the Laser Safety Program successfully and I must have my eyes tested by Dr. Poncho immediately and once every year before my anniversary date, if actively working with Lasers. Upon termination with MDA I must also have an eye examination by Dr. Poncho, to ensure my own eye protection for the future.

The Medical Surveillance Program eye examination will be paid by MDA to ensure an appropriate exposure level of the employee.

To get information on Laser eye examinations please contact the Health & Safety Manager. Upon giving notice of your termination, contact the Health & Safety Manager so that an appointment can be arranged within the two weeks before you leaving the organization.

When you have completed your eye examination tests, notify the Health & Safety Manager as he/she needs to approve the invoices that come from the doctor as well as monitor the Laser safety program.

I understand the conditions of MDA's Laser Safety Program and will comply with the conditions as outlined above. Work Instruction MDR-STD-M.7915 under section 6.47, will also detail guidelines for working with lasers.

Name:

Print

Date:

Signature:

Time to complete computer based training:

Return this form to the Health & Safety Manager.

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7.11 Operational Assessment

7.11.1 Intended Use or Application

To standardize our operations so as to be aware of the risks associated with new business, identify the risk hazards for all new proposals, programs, modifications etc. and to ensure that associated costs are factored into the proposal, as well as preventive maintenance.

When new proposals are being considered or modifications are being made on any process, equipment, etc., an assessment should be completed to identify the risks, hazards or training required in the performance of the work.

7.11.2 Employees are required to

- 1) Follow the outlined operational procedures as in the contract and ensure that safety procedures are followed.
- 2) Participate in any training programs as outlined by the manager or EHS Manager.
- 3) Ensure that training is received, if required and hazards identified.
- 4) Ensure an operational assessment HR049 is completed whenever there is a new program or modification made to ensure risk hazards are identified.

7.11.2.1 Managers are required to

- 1) Complete an Operational Assessment, HR049 whenever there is new business or modifications made to ensure the risk hazards are identified, evaluated and given to the EHS Manager for review and a signature.
- 2) To review and understand the proposal work, operation and/or equipment before the assessment is completed.
- 3) Determine any operational and known safety risks associated with the project.
- 4) Inform employees of any safety hazard/risk associated with a project that you are aware of.
- 5) Identify the training requirements, if necessary, to ensure employees understand the job and what is required of them.
- 6) Incorporate into the proposal environmental health & safety costs, safety equipment, safety training and any engineering controls.
- 7) Ensure that any controlled products are ordered.
- 8) Inform the EHS Manager of any new projects or program/equipment modification, or training required, prior to any work being performed.
- 9) Conduct a pre-start-up inspection with the EHS Manager and a JHSC member.

7.11.2.2 Health & Safety Manager is required to

- 1) Work with the line managers to identify any safety hazards and ensure that the Occupational Health & Safety Act and Regulations is being followed.
- 2) Attend, upon request, bid and proposal meetings.
- 3) Review the Operational Assessment form HR049 and sign off on any identifiable risk or hazard.
- 4) Provide the estimated cost of any safety equipment or training so that it may be factored into the proposal costs.
- 5) Arrange with the manager for the appropriate training.

7.12 Overhead Crane and Hoists

7.12.1 Intended Use or Application

To establish safe operational practices in the use of overhead cranes and hoists.

7.12.2 Work Steps

Types of Cranes:

- Bridge – operated by cab, pendant or radio
- Gantry – half or full
- JIB – operated by pendant
- Monorail – operated by a pendant

MDA has Monorail and Gantry crane in operation.

7.12.2.1 Instructions

Only employees who have been trained, certified and authorized are permitted to operate hoists and cranes.

See Schedule "A" for updated certified trained operators.

Cranes are to be used only if the operator is feeling well and physically fit.

7.12.2.2 Employees are required to

- 1) Be trained, qualified and authorized before operating cranes or hoists, every two years.
- 2) Complete a pre-operational check list before the crane/hoist is used in accordance with HR049.
- 3) Ensure the maximum limit weight is marked and on the crane and do not exceed this limit.
- 4) Do not use the crane/hoist if the switches are not working properly, if cable appears worn or any other items on the check list that may hinder this equipment from operating properly. Ensure the rig is safe, tagged and certified.
- 5) Ensure that no person is under the load or within the danger zone of the load being lifted.
- 6) Wear appropriate personal protective equipment as stated herein.
- 7) Test operating controls before operation, to ensure the equipment is safe and is serviceable.
- 8) Place operating controls in the "off" position with the brakes applied before leaving the hoist or crane and place in a designated area away from aisle ways.
- 9) Report any defects to the manager immediately.
- 10) Stay clear of overhead loads. Stand to one side, and if necessary, use a rope to guide the load. If the load is bulky or difficult to handle, get assistance.
- 11) Ensure the load is balanced before attempting to lift any load.
- 12) Place the lifting mechanism directly over the load to avoid swinging of the load during operation.
- 13) Lift the load only high enough to clear the floor and area from objects.
- 14) Never leave the area with a load suspended.

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- 15) Ensure that any loose objects such as tools, parts etc. are removed before attempting to lift.
- 16) Be protected from falling objects or materials around them.
- 17) Raise hooks high enough, when not in use, to avoid any employees from striking the equipment.
- 18) Not place the crane or hoist in reverse until it has come to a full stop.
- 19) Be constantly aware of the safety of the load when being lifted.

7.12.2.3 Managers are required to

- 1) Ensure the employee has received training and is certified before using any cranes or hoists.
- 2) Ensure a pre-operational check list is completed by employees before using the crane/hoist in accordance with HR049.
- 3) Have cranes and hoists serviced at least annually and a copy of the service maintenance kept on file.
- 4) Ensure the maximum load capacity is marked on the crane by a qualified contractor and the load does not exceed the capacity.
- 5) Ensure that employees do not stand, walk or work under a suspended load.
- 6) Ensure the operator is working safe and no person is allowed to ride on the load or hook.
- 7) Ensure that appropriate personal protective equipment is supplied and worn.
- 8) Ensure the employee is protected from any falling objects or material around them while operating the crane.

7.12.2.4 Health & Safety Manager is required to

- 1) Provide training, requested by the manager, prior to any employee operating a crane or hoist.
- 2) Maintain updated records of crane and hoist training.
- 3) Ensure employees are trained/retrained every two years.

7.12.3 Schedule "B" – Crane and Hoist Equipment Posting

Cranes are not to be used if the operator is not feeling well and physically fit.

Only employees who have been trained and certified are permitted to operate hoists and cranes.

Employees Are Required to:

- 1) Be trained, qualified and authorized before operating cranes or hoists, every two years.
- 2) Complete a pre-operational check list before the crane/hoist is used.
- 3) Ensure the maximum limit weight is marked and on crane and do not exceed this limit.
- 4) Do not use the crane/hoist if the switches are not working properly, if cable appears worn or any other items on the check list that may hinder this equipment from operating properly. Ensure the rig is safe, tagged and certified.
- 5) Ensure that no person is under the load or within the danger zone of the load being lifted.
- 6) Wear appropriate personal protective equipment, hard hat or bump cap as required.
- 7) Test operating controls before operation, to ensure the equipment is safe and is serviceable.
- 8) Place operating controls in the "off" position with the brakes applied before leaving the hoist or crane and place in a designated area away from aisle ways.
- 9) Report any defects to the manager immediately.
- 10) Stay clear of overhead loads. Stand to one side, and if necessary, use a rope to guide the load. If the load is bulky or difficult to handle, get assistance.
- 11) Ensure the load is balanced before attempting to lift any load.
- 12) Place the lifting mechanism directly over the load to avoid swinging of the load during operation.
- 13) Lift the load only high enough to clear the floor and area from objects.
- 14) Never leave the area with a load suspended.
- 15) Ensure that any loose objects such as tools, parts etc. are removed before attempting to lift.
- 16) Be protected from falling objects or materials around them.
- 17) Raise hooks high enough, when not in use, to avoid any employees from striking the equipment.
- 18) Not place the crane or hoist in reverse until it has come to a full stop.
- 19) Be constantly aware of the safety of the load being lifted.

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7.12.4 Schedule "C" – Approved & Certified Crane Operators

Certified operators list is available through the H&S Manager or through the Human Resources department.

7.13 Personal Protective Equipment

7.13.1 Intended Use Or Application

To ensure that employees participate and receive personal protection where there could be a potential hazard or no feasible engineering controls.

Whenever a worker is exposed to the hazard of any injury, personal protective equipment, (PPE) provided by the employer, appropriate in the circumstances, shall be worn.






In areas identified or on programs where identified by the manager if there is a potential of any hazards. Training must also be given to ensure proper use.

7.13.2 Work Steps

To ensure the proper personal protection equipment necessary, for the task/program, check the Material Safety Data Sheets (MSDS) and confirm with your Manager as stated herein.

7.13.3 Instructions

- 1) Foot Protection must be worn by employees working in designated areas, on specific programs or in areas where there is signage. All protective footwear must conform to CSA Standard Z195-M92 "Protective Footwear." Safety Footwear must be CSA approved with steel toe protection plus ESR (Electric Shock Resistant).

			
<p>Electric Shock Resistant Footwear carries this GSA marking tag. Footwear must withstand (under dry conditions) a test potential of 18 kV (18,000 volts), 60 Hz for a period of one minute, without discharge to ground of more than one milliamperere (1 mA).</p> <p>*Use where there is danger of high voltage</p>		<p>If the triangle is Green it is Grade I; Yellow it is Grade II; Red it is Grade III</p> <p>The triangle designates a puncture resistant sole able to withstand 135 kg. of pressure, (300 ft. lbs.) without being punctured by a 5 cm. nail.</p> <p>** Use where there is danger of punctures.</p>	
			
<p>Grade I will withstand 125 joules, or 93 ft. lbs.; a 50 lb weight dropped from a height of 22"</p>	<p>Grade II will withstand 90 joules, or 65 ft. lbs; a 50 lb. weight dropped from a height of 16"</p>	<p>Grade III will withstand 60 joules, or 45 ft. lbs.; a 50 lb. weight dropped from a height of 10.5"</p>	

Contact the Health & Safety Manager, BEFORE you make any purchase, as a specific form for our supplier must be completed. The Safety Manager will also log your purchase as there is a safety footwear allowance outlined in the applicable collective agreement.

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Reimbursement cost for safety footwear is outlined in the applicable collective agreement. An expense form must be presented to the EHS Manager for approval and recording.

- 2) Hearing Protection must be worn in areas where noise levels are greater than 80 decibels and the duration of exposure is more than permitted for the particular sound level and shall be maintained in good condition by the employee. A choice of earmuffs or earplugs shall be given as long as the noise reduction rating (N.R.R.) meets the specifications. Engineering will be involved to first see if a reduction of the noise level can be made by installing sound barriers etc. if applicable. Ear Muff instruction program, see Schedule "A"
- 3) Respirators appropriate for the hazard (MSA approved) shall be worn prior to working in, or entering an area where he or she is likely to be exposed to a hazard from inhaling of gas, vapours, fumes or dust particles.
- 4) A worker exposed to the hazard of head injury shall wear head protection appropriate in the circumstances. Hard hats shall be in compliance to the Canadian Standards Association. (C.S.A.) or ANSI Approved, for appropriate protection in the circumstances.

Hard hats or bump caps must be worn when working with the overhead crane or with the hardware when supported by a crane or hoists, and above shoulder height. When the ground support is being attached or detached to the boom head protection is also required.

- 5) Hand and Body Protection must be used when employees are exposed to a potential hazard; sharp objects, hot or cold materials, electrical shock, abrasion, molten or corrosive materials. Condition of all gloves shall be inspected the user and replaced or disposed of in an appropriate manner. Hand and body protection must be adequate to protect against the hazard encountered. Clothing that is loose or dangling shall not be worn near any rotating shaft, spindle, gear, belt or other source of entanglement.
- 6) Eye Protection must be worn where there is a potential for any eye injury or danger of particles, liquids etc. which could come in contact with the eye and cause an injury. Safety Goggles are to be worn where there is a danger of a chemical splash and/or non hazardous fumes. See Schedule "B" for Safety Prescription Glasses and reimbursement.
- 7) Fall Protection must be worn where there is a hazard of falling and the height of fall is greater than 3m (10') A serviceable safety belt or harness and lifeline must be worn which is adequately secured to a fixed support and so arranged that the wearer cannot fall freely for a vertical distance of more than 1.5m (5'). The fall arrest system shall have capacity to absorb twice the energy and twice the load and be equipped with a shock absorber or other devices to limit the maximum arresting force to 8.0 kilonewtons (1800 lb.) to the wearer. All fall protection must be visually inspected before each use for any signs of wear and records kept, by the department manager, of the inspection results.
- 8) Laser Exposure An operator must be authorized and trained when using diffusely reflective materials in or near the beam path. Personnel may enter the controlled area as they have been trained in safety procedures and have a key for admittance. Untrained employees or visitors may be escorted into this area as well as into the hazard zone. If the laser is in operation, then those entering the hazard zone must wear special eye protection which is provided. Have the laser secured so that the beam path is above or below eye level of a person in any standing or sitting position. All windows and doorways, open portals from an indoor facility must be covered or restricted in such a manner as to reduce transmitted laser radiations below the applicable ocular MPE. Any equipment not in use must be left disabled so as to prevent unauthorized use.

In an emergency situation a panic button is available for deactivating the laser or reducing the output levels in critical areas. All laser equipment is controlled by key switches. Area posting signs are in place to identify laser hazard class and control area as well as specific rules and work practices. A rapid egress and admittance has been designed for safety controls.

A medical surveillance program must be in place for a yearly eye examination which must occur prior to commencement of working with the system.

Every three (3) years the laser training program must be reviewed for employees who are active in the program.

When using the CO2 laser, skin must be protected by tightly woven fabrics, opaque gloves and a laboratory jacket with long sleeves, for arm and hand protection.

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Detailed policy and procedures are located in the laser safety manual located with the Laser Safety Manager, ANSI standard 2136.1-1993, located in the Library

These above guidelines apply when working in the:

- Laser Lab (R & D Lab)
 - Laser Lab (Vibration)
 - Sensor Lab & other temporary facilities:
 - Advanced Tech Dev Lab, ATD
 - Or any other area where lasers are used.
- 9) U.V. Exposure ultra violet rays procedure will be followed when using equipment of any U.V. exposure. (ie. sun gun and black light testing) Gloves and glasses must be worn.

HOT Work is any type of work where there is a potential hazard to the employee. Safety glasses and gloves must be worn and exhaust fumes adequately ventilated. Bake ovens in the laser lab require only gloves to be worn. Hot work permit, see HR045. HOT WORK permit forms are located in the Machine shop area, from the Facilities Manager, or EHS Manager.

7.13.3.1 Employees are required to

- 1) Attend training for the use and maintenance of Personal Protective Equipment.
- 2) Wear required personal protective equipment in areas identified by signs, on tasks which your manager has specified PPE to be worn.
- 3) Wear your personal protective equipment in the prescribed manner in which it was intended and described to you.
- 4) Report any defects or deficiencies in your equipment and ensure it is repaired or replaced.
- 5) Report any changes which you are aware of, in your health, to your manager and the EHS Manager.
- 6) Make your manager aware of any personal preferences, should any PPE provided to you is not suitable.
- 7) Maintain the cleanliness and safekeeping of your personal protective equipment. Inspect your PPE on a regular basis to ensure it is in good condition and report to you manager should you need a replacement or repair. Safety eye wear needs to be cleaned regularly to maintain a clear vision.
- 8) Jewellery or loose/dangling clothing must not be worn near rotating shafts, spindles, belts or other sources of entanglement.
- 9) Any personal protective equipment that is worn next to the skin should not be shared by another employee.

7.13.3.2 Managers are required to

- 1) Identify any potential hazards where PPE is required. Provide appropriate safety equipment, ensure it is properly fitted, worn and provide appropriate training in the use, care and maintenance of the equipment.
- 2) Enforce the use of personal protective equipment where applicable and monitor the proper use of it. Wear personal protective equipment in areas identified or on programs where there could be potential hazards. Ensure that employees working on electrical equipment have locked-out the power source and wear appropriate PPE.

7.13.3.3 Health & Safety Manager is required to

- 1) Ensure that PPE is being worn.
- 2) Ensure that any required training is provided.

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7.13.4 Schedule "A" 6.32 – Ear Muff Instruction Program

Ear Muff Protection is maximized when:

- Proper selection is made according to the noise levels.
- A training program is in place.
- Proper fitting techniques are reviewed and demonstrated.
 - The ear cushion surface must be pressed firmly against your head. Hair must be removed from under the cushions.
 - Rotate the headband to the desired wearing position but over the head is the most effective rather than behind the head or under the chin.
 - Adjust the head band for minimum space between the head and the band.
 - Keep all foreign objects from under the cushions and do not attempt to alter the band.
 - Ear Muffs must be checked on a regular basis. If the ear pads become worn, harden or cracked, they must be replaced. It is preferable to clean the muff occasionally with alcohol or soap and water to remove perspiration and body oils.
 - Notify your manager immediately if you require replacement ear pads and the Health & Safety Manager will purchase the requirements.
 - Store your ear muffs in a clean, safe environment and ensure that they are not shared property unless it is first cleansed with a disinfectant solution.
 - Any problems or concerns, contact your Health & Safety Manager at Ext. 4794.



7.13.5 Schedule "B" – 6.32 – Safety Prescription Eye Glasses

To determine if Safety Glasses are required, it must first be approved by your Manager. MDA will reimburse you as long as both lens and frames are safety approved by the optician.

This means that the lens must be polycarbonate and the frames must have the safety rating and durability, which can be determined by your optical practitioner.

Some functions at your workplace require you to have side shields, on your glasses, but you could request removable ones, in case you wish to wear your glasses on a regular basis, other than at work.

There are several selections of safety frames, from a wire frame to a heavier plastic.

Your statement from the optician **must** indicate you have purchased safety glasses, the date of purchase, and the cost of frames and lens must be listed separately, in order for the Health & Safety Manager to calculate your reimbursement in accordance with the provisions of the collective agreement.

If you need an eye doctor, there is a qualified professional, Dr. William Poncho, who will bill MDA directly for his service. He is located at Bestgate Centre, 40 Finchgate Blvd, Suite 212, Bramalea. (Hwy #7 & Finchgate, west of Chrysler Drive).

Be sure to inform the doctor you are from MDA and what kind of an eye test you need. (Laser or Regular)

7.14 Radiation Safety

7.14.1 Intended Use or Application

To take all reasonable precautions, consistent with the Nuclear Safety and Control Act and Occupational Health and Safety Act and Regulations, to protect persons and others working with potentially harmful radiations sources;

To provide information, resources, safe handling procedures, precautionary measures, emergency response procedures for users of sources or devices containing radioactive materials so as to prevent unnecessary human radiation exposure;

To comply with the related government regulations.

The As Low As Reasonably Achievable (ALARA) principle seeks to keep all doses of radiation as low as reasonably possible, social and economic factors taken into consideration. No practice involving the exposure to ionizing radiation may take place if there is no benefit as a result of carrying out the practice. Radiation exposures must be kept below the statutory federal limit regardless of the practice. Persons using radioactive material must endeavor to keep all radiation exposures as low as possible.

The ALARA concept has been adopted by MDA as the basic philosophy governing the use of radioactive materials at the Brampton facility.

Radioactive material on the Brampton facility is used primarily for the APXS program. The use of radioactive material is an important and valuable tool in research. Such research could be interrupted or stopped completely without the use of radioactive materials. MDA endeavors to ensure that the use of radioactive materials at the Brampton facility is carried out in a safe manner with due regard for employees and the environment

It is the responsibility of all persons who work with radioactive material to become familiar with APXS Handling Plan (MDA-APX-PLN-8870).

7.14.2 Work Steps

There are specific federal licenses to apply for use of radioisotopes and the license applies to a whole facility not just a lab room. Currently we have on-site sealed radioisotopes for the purpose of the APXS program, however Fe-55 and Co-57 are considered EXEMPTION QUANTITIES radioisotopes, meaning no license required for their use, provided that we do not exceed the amount of sealed sources brought on site. This is regulated by the Nuclear Safety and Control Act, Nuclear Substances and Radiation Devices Regulations.

Under this regulation, a person may carry on any of the following activities without a license to carry on that activity:

- (a) possess, transfer, import, export, use, mine, produce, refine, convert, enrich, process, reprocess, manage or store a nuclear substance, if the quantity of the nuclear substance does not exceed its exemption quantity;
- (b) possess, transfer, import, export, use, abandon, produce or service a sealed source that contains less than the exemption quantity of a nuclear substance, if not more than 10 such sealed sources are possessed by the person in any calendar year;

MDA does not meet the facility requirements for non exempted radioisotopes and quantities. Please consult with H&S Manager if you are planning to purchase or bring radioisotopes on-site.

MDA will pay for dosimeters and monitoring of radiation exposure of employees who may be exposed to any work which would be considered a risk, whether it is a source of ionising and non-ionising radiation.

7.14.2.1 Employees are required to

- 1) Comply with the safety rules and procedures prescribed.

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- 2) Remain outside the hazard zone when the hazard light is flashing. If working inside the area, wear suitable personal protective equipment as stated herein.
- 3) Receive training, be medically screened, if required, and be knowledgeable of all safety practices.
- 4) Report immediately all accidents, incidents or near-misses to your manager.
- 5) Lock-out any equipment not in use, so as to prevent unauthorized use.
- 6) Know the location of the equipments emergency panic button, prior to use, or any control key switch in case of an emergency.
- 7) Be familiar with the emergency exits locations.
- 8) Participate in any required training.

7.14.2.2 Managers Responsible are required to

- 1) Ensure all personnel working with equipment that has any type of radiation are medically assessed, adequately trained on safety practices, precautions and procedures.
- 2) Ensure employees do not bring any UV, Laser or Ionising Radiation sources onto a MACDONALD DETTWILER site without consulting with the H&S Manager regarding the equipment.
- 3) Provide and ensure that required Personal Protective Equipment is worn as stated herein.
- 4) Ensure appropriate training takes place for off-site work.

7.14.2.3 Health & Safety Manager is required to

- 1) Coordinate the medical surveillance program.
- 2) Maintain the program for the medical surveillance program.
- 3) Arrange for training above Laser class II, in conjunction with the laser safety Manager.
- 4) File any medical surveillance reports and make employees aware of when the next eye examination is required. Maintain a file for all radiation dose records of any employee who may have been exposed. (Federal Government AESB guidelines).

7.15 Confined Space

7.15.1 Intended Use or Application

To protect employees from the hazards of entry into a confined space. eg. (cooling tower, privately maintained manholes)

Prior to entering into an area that may seem restricted, the following must be assessed with the EHS Manager and the manager, to determine if special attention must be followed and Schedule "A" form to be completed. If toxic gases, vapours, dust, fumes or poor visibility due to inadequate lighting are present and etc. then the following elements must be considered and appropriate actions taken to ensure a safe work environment.

7.15.2 Requirements

We do not have any confined spaces, therefore when entering the cooling tower, Schedule "A" should be completed to ensure the necessary safety requirements. Cooling tower is entered by an outside contractor, only when the system needs repairing.

7.15.2.1 Managers are required to

- 1) Determine, with the EHS Manager, areas that are to be classified as restricted nature and which of these require a special program entry as in Schedule "A".
- 2) Ensure that an assessment has been conducted to determine the potential hazards of the restricted area.
- 3) Determine if the work may be performed outside of the restricted area.
- 4) Ensure training has been provided to employees affected and responsibilities understood prior to entry to the restricted area.
- 5) Complete a restricted entry form prior to performing any work. (Schedule "A" attached)
- 6) Should this area be assessed as restricted and the person doing the work feels an attendant is necessary, then a contact person must be made available until the work is completed.
- 7) Ensure any electric equipment, in the restricted area, has been locked out prior to any entry.
- 8) Ensure the person who is performing the work has a portable telephone and aware of contact persons extension numbers.
- 9) Ensure that appropriate warning signs are posted in the immediate area.
- 10) Ensure a copy of the completed entry form has been given to the EHS Manager.

7.15.2.2 Employees Identified are required to

- 1) Have received the required training for entering a restricted area safely, use and maintain protective equipment, as prescribed, and be familiar with rescue procedures.
- 2) Complete the restricted entry form prior to performing work in the restricted area. (Schedule "A" attached)
- 3) Notify your manager and stand-by person if required, before entry.
- 4) Carry a telephone with you in case of an emergency, available at facilities, and a list of telephone extension numbers.
- 5) Follow all safe working procedures.
- 6) Notify your manager and stand-by person as soon as the work is completed.

7.15.2.3 Contractors are required to

- 1) Contact the Facility Manager in charge of the area before any work is done in the cooling tower and complete Schedule "A"

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7.15.2.4 Health & Safety Manager is required to

- 1) Establish and implement procedures and practices by which the restricted area can be entered safely.
- 2) Assess the area with the manager to determine if restrict entry is required.
- 3) Develop a written permit system, Schedule "A" and retain these copies for at least five years.
- 4) Ensure the employee, stand-by person or contractor, has received adequate understanding of the hazards and the procedures for working safely in and around the restricted area.



7.15.3 Schedule "A" – Restricted Entry Form

Effective Date: _____ Entry Time: _____ Completed Time: _____

Location of Restricted Area (previously assessed): _____

This permit is valid for only one shift on the date indicated above and this form, required only when the criteria for restricted area is met as outlined in section 4.

- | | | | | |
|---|-------|-----|-------|----|
| 1. Electrical supply lines disconnected and/or blanked off. Valve turned off and locked/tagged out? | _____ | Yes | _____ | No |
| 2. Hydraulic and electrical power locked off? | _____ | Yes | _____ | No |
| 3. Mechanical ventilation supplied, if necessary? (Fan) | _____ | Yes | _____ | No |
| 4. Standby person notified. | _____ | Yes | _____ | No |
| 5. Any Personal Protective Equipment worn? | _____ | Yes | _____ | No |

Name of person entering restricted area: _____

Name of standby person: _____

Managers signature: _____

Notified manager and standby person of job completed: _____

(Time)

Copy of this form is to be given to the EHS Manager.

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7.16 Solar Simulator (Sun Gun)

7.16.1 Intended Use or Application

To govern the use of MDA's Solar Simulator which generates UV radiation and Ozone and to ensure safe procedures to prevent any unnecessary injuries.

7.16.2 Work Steps

Any person who must occasionally be exposed to such radiation must wear prescribed eye protection or masks with suitable radiation-filtered lens as well as other protective clothing to preclude burns.

The MDA solar simulator consists of a powerful Xenon lamp designed to duplicate the spectrum of the sun as closely as possible, produces simulated solar radiation in intensity far greater than that of ordinary sunlight which reaches Earth after filtration through the atmosphere. This light consists of infrared, ultraviolet, and visible light.

Ultraviolet radiation is an invisible form of light, present in ordinary sunlight. In greater concentrations, it can burn the eyes and skin. All solar produce such concentrations, in particular, it can cause severe skin burns and eye damage up to and including total and permanent blindness.

Ultraviolet radiation is not apparent to the ordinary human senses except through symptoms that appear only after the damage has been done. Fortunately, ordinary clothing or even window glass, eliminate the worst effects of normal concentrations.

7.16.2.1 Employees Are Required To

- 1) Adhere to all safety precautions while in the presence of ultraviolet radiation.
- 2) Ensure only authorized personnel are permitted to operate and maintain Solar Simulator equipment.
- 3) Exercise traffic control to ensure that other personnel who may find it necessary to enter the area will not be exposed to dangerous radiation and will obey the instructions of the operator.
- 4) Follow the operational procedure, before commencing, as outlined in 6.51.2.4.
- 5) Not operate or remain in the vicinity of devices that produce ultraviolet radiation without wearing prescribed eye and skin protection, ankle length pants or skirt and a long sleeved shirt. Eye wear must have suitable radiation-filtered lens.
- 6) Not expose any unclothed portions of your body to ultraviolet radiation without applying a sunscreen of SPF 30 or greater.
- 7) Ensure that the curtain to the adjoining office shall be closed to prevent viewing or any unnecessary exposure to UV radiation during solar simulator operation.
- 8) Get approval from the person in charge or the Health & Safety Manager before the housing of the Solar Simulator is opened.
- 9) Wear special designed heavy insulated gloves, approved safety glasses, protective clothing and a full face shield when changing the simulator lamps. These lamps are an explosion hazard. Unplug both power cords prior to servicing.
- 10) Place simulation lamps in protective housings immediately during changing and storage because of their high internal pressure.
- 11) Ensure the venting is connected before operation as the Solar Simulator produces Ozone.
- 12) Stop operation if peculiar smells are noted.
- 13) Make no adjustments to the Solar Simulator, including any adjustment of the lens.

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- 14) Read this work instruction, before using the equipment, have an instruction session with P. Jasiobedzki and send an email to the Safety Manager to indicate training has been completed.

7.16.2.2 Manager or Person in Charge Is Required To

- 1) Ensure that employees are trained before using the Solar Simulator and that all safety measures are followed.
- 2) Ensure that appropriate warning signs are posted and that curtains blocking the area are in place and drawn when the Solar Simulator is operating.

7.16.2.3 Health & Safety Manager Is Required To

- 1) Ensure that all safety precautions are being followed and that employees are comfortable with the instructions they have received in operating the equipment.
- 2) Record the names of employees who have had training and a follow up instructional session.

7.16.2.4 Operational Procedures

- 1) Wear the appropriate personnel protective equipment as previously indicated.
- 2) Ensure the curtains are in place and that the proper warning signs are posted.
- 3) Position the Solar Simulator in the appropriate position.
- 4) Notify the Health & Safety Manager, by email, after you have read this work instruction and had a follow up session.

To Start up:

- 1) Close the aperture by moving the aperture handle near the front of the unit to the on position.
- 2) Ensure the power switch is off. (bottom of switch depressed)
- 3) Ensure the Igniter switch is in the off position. (middle position)
- 4) Connect the 120V power cable.
- 5) Connect the other two power cables to the electrical outlets.
- 6) Activate the power switch.
- 7) Wait until the fan has stabilized. (~10s)
- 8) Switch the igniters to the 'Auto' position. If the lamp fails to start, switch to 'off' and contact the person in charge or EHS Manager for required service.
- 9) Open the aperture, but keep it closed when illumination is not required.

7.16.2.5 To Shut Down

- 1) Close the aperture
- 2) Depress the power switch.
- 3) Move the igniter switch to the 'off' position.
- 4) Disconnect the power cables.

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7.17 Test Equipment

7.17.1 Intended Use Or Application

To ensure the safe use and handling of any test equipment, which means, before using any test equipment, make sure you receive training from a qualified person who can identify the risks and hazards of the equipment.

7.17.2 Work Steps

7.17.2.1 Employees Are Required To

- 1) Receive training on the equipment that you are to use.
- 2) Be familiar with the equipment and be comfortable about using it.
- 3) Be sure the equipment is properly locked-out, if required, and cleared of any other connections before you power on to avoid injury.
- 4) Wear or use any required Personal Protective Equipment (PPE).
- 5) Check with your manager, should you have any concerns.
- 6) Return the equipment in the same condition as they received it.
- 7) Replace any guards, if they have been removed for testing.

7.17.2.2 Responsible Person or Manager Is Required To

- 1) Make sure employees are comfortable with using the equipment and understand the procedures.
- 2) Train employees on the equipment, prior to any use.
- 3) Ensure the emergency button or on/off switch is visible and in working order.
- 4) Ensure employees wear Personal Protective Equipment, (PPE) if required.

7.18 Transportation of Dangerous Goods

7.18.1 Intended Use Or Application

To ensure compliance with the Federal and Provincial Transportation of Dangerous Goods Act, Regulations and Schedule.

We must comply when handling, transporting or receiving dangerous goods which might endanger a threat to life or health, property damage or cause harm to the environment if spilled or become involved in an accident or fire.

NO DANGEROUS GOODS WILL BE SHIPPED OR RECEIVED UNTIL THE APPROPRIATE STEPS HAVE BEEN TAKEN.

7.18.2 Work Steps

A Certificate of training must be obtained, at least every three years or sooner, if required by legislation and kept on file for 5 years. This certificate (Transportation of Dangerous Goods) must be carried with you while transporting any dangerous goods and certificate posted at the workplace. Air transported dangerous goods must be documented on an International Air Transport Association (I.A.T.A.) approved document.

When shipping empty containers, print, "Residue-Last Contained," following the shipping description on the document. Shipping empty containers which have not been cleaned or purged may still contain some hazardous residue. Placards must be left on the vehicle until fully purged.

7.18.3 Instructions

Materiel coordinator is our designated person trained in ground and air Dangerous Goods Transportation Regulations. Please contact her before any TDG shipments are made. If not available, contact the Manager, Materiel for instruction.

7.18.3.1 Shipper/Receiver Support Operator Is Required To

- 1) Have a TDG certificate in order to be authorized to ship out any regulated goods.
- 2) Complete an in-house document before goods can be transported (i.e.; waybill, trip ticket, manifest, pro-bill, etc.
- 3) Refer to the Material Safety Data Sheet (MSDS) for proper shipping name and classification. Verify with TDG regulations, (Schedule II) or contact the supplier of the dangerous goods, if the MSDS is not available.
- 4) Check Schedule II and the special provisions in Schedule III of the TDG for exemptions and prohibitions.
- 5) Check the MSDS to see if the material to be transported has any conditions of incompatibility. It spells out if certain products cannot be shipped together. (Flammables with combustibles etc.) Incompatible materials must be packaged separately and in some instances may not be transported in the same vehicle requiring separate documentation.
- 6) Follow Schedule II, (Transportation of Dangerous Goods) TDG to ensure transporting and the quantity allowed to be shipped via passenger road vehicle.
- 7) Source an approved carrier for transporting dangerous goods. Verify that the driver has received the required training in the Transporting of Dangerous Goods.
- 8) Contact your supervisor if the shipping container has become damaged or is leaking. Choose good quality packaging that will not leak or spill under normal transporting conditions. Packages should not be overfilled.
- 9) Label packages according to their primary class and in some cases with the subsidiary class, as indicated on the shipping document. Place labels on the side of the package and not on the top or bottom. Place the shipping name and product identifier number (PIN) on the same side as the label.

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- 10) Complete the shipping document as much as possible and then get in touch with the Materiel Co-ordinator , for proper labelling or any other TDG required information.
- 11) Ensure that liquid dangerous goods must have a label indicating an upright position during transporting.
- 12) Have at least two sets of labels on large packages, more than two cubic meters and must have safety marks on opposite sides of the package.
- 13) Determine placarding requirements as per specific class and division for required quantities. Placarding must be placed on the vehicle at the time when the product is being loaded onto the vehicle, depending on the type and quantity of material. Refer to the placarding section in the TDG regulations and schedule.
- 14) Give shipping documents and placards to the carrier, if required. One copy of the shipping document must be placed in the vehicle within reach of the driver. The shipper must supply the appropriate placard.
- 15) Check to see that placards are mounted on all four sides of the truck. If the carrier is transporting more than MDA's products, making the placards inappropriate, verify that the driver placards the vehicle correctly. Contact your manager if you have any doubts this is done correctly.
- 16) Notify the Health & Safety Manager that dangerous goods are being transported. EHS will review the shipping document, prepare an emergency response plan and arrange a 24 hour emergency contact person to be available.
- 17) Check to ensure that dangerous goods being transported should not be in a vehicle containing food unless separated by a partition, which would prohibit contamination in the event of a spill or emission. Verify with the TDG list to ensure goods being shipped are compatible.
- 18) Notify your manager of any deficiencies and corrective actions taken.

7.18.3.2 Receiver/Material Support Operator Is Required

- 1) Check the shipment before accepting it to determine if;
 - a) the information on the shipping document is complete and accurate.
 - b) the product is packaged to withstand the condition of transport.
 - c) the outer container is labelled according to the classification indicated on the shipping document.
 - d) the shipping name and product identification number is denoted beside the classification labels.
 - e) an orientation label is affixed to the outer package containing hazardous liquids.
- 2) Deliver a copy of the shipping document to MDA's end user with the shipment.
- 3) Retain one copy of the shipping document for the carrier's file for 2 years.
- 4) When all the dangerous goods have been removed from the vehicle and no residue remains (cleaned and purged or loaded with nondangerous goods) the cleaner/unloader shall remove placards from the vehicle.
- 5) Notify the Materiel Co-ordinator, of any deficiencies and corrective actions taken.
- 6) Report "dangerous occurrences" which occur after charge of the goods have been transferred from the carrier. The Health & Safety Manager will report to the appropriate agency if necessary.

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7.18.4 Schedule "A" – 6.36 – Transportation of Dangerous Goods

** New Legislation changed – Aug 15/02, also in 2005*

MDA Trained Employees

Available from Human Resources.

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Company Sensitive

7.19 Ultra Violet Inspection (UV)

7.19.1 Intended Use Or Application

To ensure safe operational practices for ultra-violet light inspection of parts and assemblies where specific cleanliness requirements must be met.

7.19.2 Work Steps

This booth or dark room must have a portable screen or curtain made from black poly-ethylene film for on-site inspection of assemblies.

The black light source shall be rated at not less than 100 watts with a minimum intensity of 1,500 microwatts per square centimetre at 12" from the face of the filter.

The black light source shall be tested on a regular basis. The lamp shall be replaced when the intensity falls below the minimum value. The black light meter shall be calibrated annually.

7.19.2.1 Employees Are Required To

- 1) Ensure that training has been conducted and that you understand the operation of this equipment before being used the first time.
- 2) Wear long sleeves, to ensure coverage of the arms.
- 3) Wear specified eye glasses, with side shields, which absorbs ultraviolet radiation.
- 4) Turn to the "ON" position and allow 5 minutes for the lamp to reach full brilliance.
- 5) Direct the light at various angles to the work piece keeping the filter face within 15" of it.
- 6) Leave the lamp burning rather than turn it off at frequent intervals to assure longer life of the bulb.
- 7) Take care not to touch the lamp housing and filter as they become hot during operation.

7.19.2.2 Managers Responsible Are Required To

- 1) Ensure the employees are trained and that they understand the safe operation of this equipment.
- 2) Ensure that safe procedures are followed as directed.
- 3) Ensure the black light meter is calibrated annually.
- 4) Ensure the lamp is replaced when the intensity falls below the specified minimum value.
- 5) Ensure the operator is familiar with fluorescent reaction arising from
 - a) Reflection of the parts surface.
 - b) Soils caused by oils, resins and chemicals.
 - c) Ensure that proper Personal Protective equipment is worn.

7.19.2.3 Health & Safety Manager Is Required To

- 1) Ensure the safe operation of this equipment and that employees are properly trained.
- 2) Maintain the training records of the employees.

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7.20 Tubular Steel Stem

7.20.1 Intended Use Or Application

To ensure precautions for safe handling and storage of the Tubular Steel Core and Control Rotation so as to prevent any employee from an injury as well as the removal from the storage spool.

7.20.2 Other

The larger sizes, 3 1/8 inch, of STEM (Storable Tubular Extendible Member) have proportionately more stored spring steel energy in the stowed condition and requires extra precaution for safe handling.

7.20.3 Instructions

To prevent the STEM from ballooning, do not allow the coiled spring effect to overcome rotational restraints on the core.

Worm gearing would ensure control since it cannot be back-driven and would solve any rewinding requirements.

It is important to handle STEM with a proper ploy shape by:

- 1) filling a previously obtained sample, which is flattened at one end with Fiberglas, filled resin.
- 2) passing the STEM through a channel containing appropriately placed Delrin rollers. A key area to apply pressure is in the centre of the convex surface close to the supply reel. This tends to put the edges in tension and prevent deformations beyond the elastic limit on other areas.

Roller guidance has much less friction than the solid plastic type, but require considerable initial adjustments to get a benign ploy.

The roller guidance should be a minimum of about 15 times the diameter of the STEM.

A 50% Relative Humidity will quickly cause unsightly oxidation. WD40 or similar oil-based preservatives must be used if the material lies exposed for any length of time. Tightly rolled material is probably adequate protection for inner layers.

7.20.3.1 Employees Using This Material Is Required To

- 1) Identify which edge should be the inner edge as it is formed.
- 2) Have the assistance of another employee when working with the STEM to ensure safe practices.
- 3) Wear Kevlar or leather gloves when handling or working with this material.
- 4) Wear safety glasses when handling this material.
- 5) Cut a nick with metal shears in the exposed edge to cut this material while still in the tubular configuration. Lay aside the shears and pull/tear around the section.
- 6) Trim the ripped edges into a proper edge with the shears.
- 7) Store this material in a safe area and ensure this spring-like material will not uncoil.

7.20.3.2 Managers Are Required To

- 1) Ensure that these outlined safety procedures are implemented and followed when storing STEM and when removing material from storage spools.

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- 2) Ensure that Personal Protective Equipment is being worn.
- 3) Ensure the assistance of a second person, when required.

7.20.3.3 Health & Safety Manager Is Required To

- 1) Ensure that training for STEM takes place and employees fully understand the hazards of this material.
- 2) Ensure that safe procedures are being followed.